

MOTOR AGE

Volume XXXIV
Number 24

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, DECEMBER 12, 1918

Fifteen Cents a Copy
Three Dollars a Year



Champion

Dependable

Drop
Gasoline
Here

Priming Plugs

Good Business for Bad Weather—Order Now!

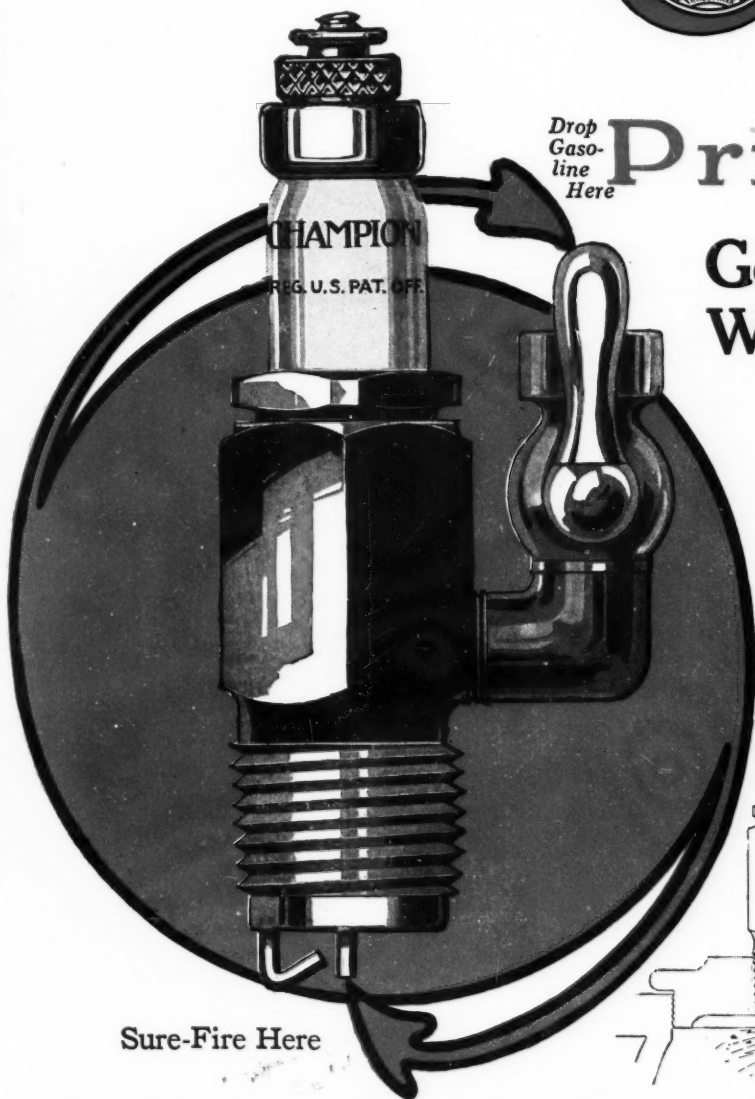
They sure-fire cold motors because the gasoline trickles down the core and drips from the electrode—right where the spark jumps.

They are imperative in cold weather for the hundreds of thousands of cars that do not have priming cups, and are infinitely better for those that do, because priming cups let the gas in too far from the spark plug.

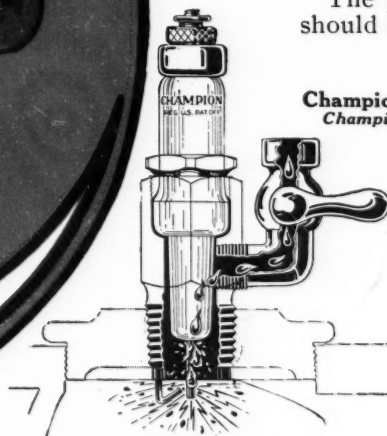
The public demand is big—dealers should order at once.

\$1.50 Each

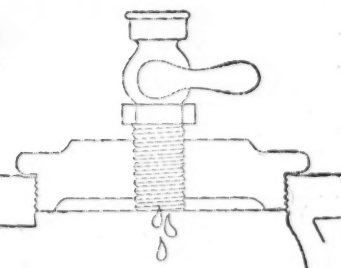
Champion Spark Plug Co., Toledo, Ohio
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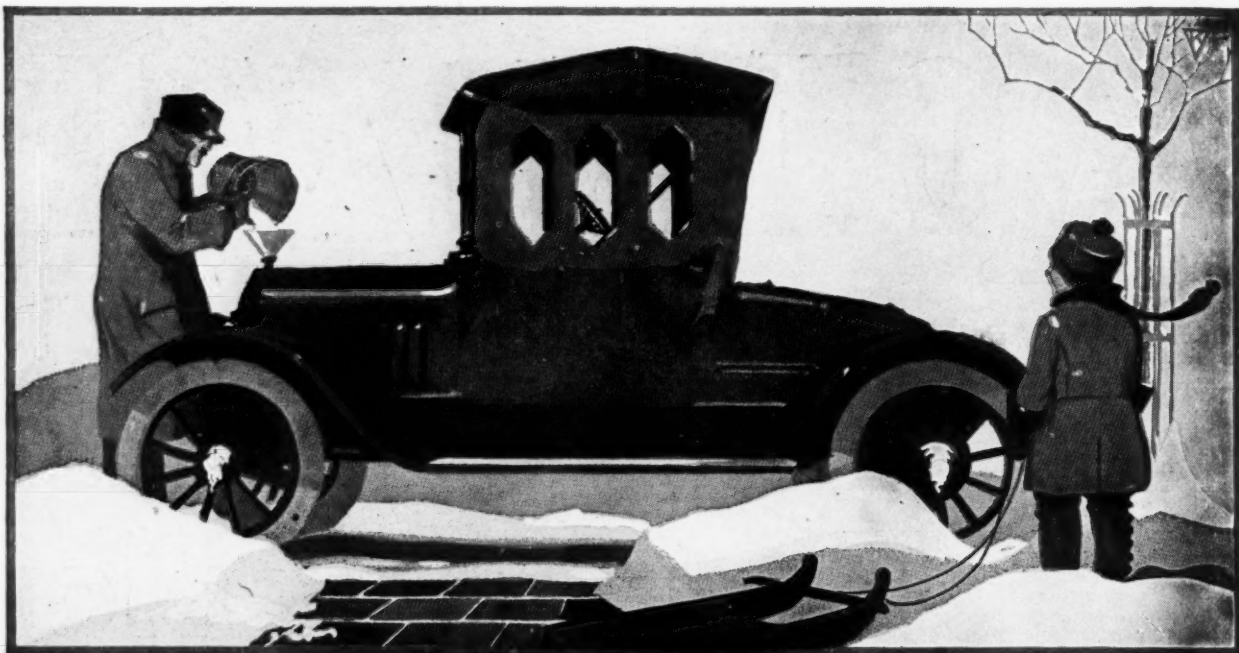
Sure-Fire Here



Sure-Fire



Chance-Fire



Ford Owners, Protect Your Car To 5° Below Zero For a \$1⁵⁰. It Lasts all Winter.

JOHNSON'S FREEZE-PROOF is the logical anti-freeze preparation to use in Fords—passenger cars and trucks. It is inexpensive—does not evaporate—is non-inflammable—easy to use—and guaranteed. One application will last all winter unless the solution is lost.

JOHNSON'S FREEZE-PROOF

Johnson's Freeze-Proof is a great time and money saver. Your cars and trucks will always be on the job and in the coldest weather it will be "Business as Usual" for you. One package will protect a Ford to 5° below zero, one and a half packages will protect a Ford to 30° below zero and two packages to 50° below zero. For larger cars, or to protect to a lower temperature, use additional Freeze-Proof according to the scale on the package. Cost \$1.50 per package in the U. S. A. East of Rockies.

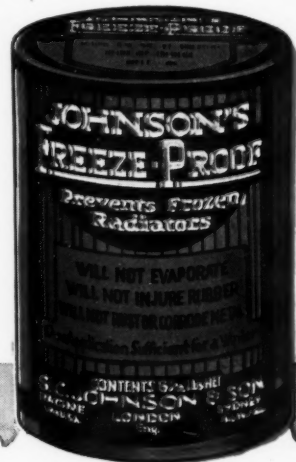
More Dependable Than Alcohol

The present high price of alcohol—its low boiling point—quick evaporation and inflammability—make it impractical. Use Johnson's Freeze-Proof, then forget that there is such a thing as a frozen radiator. Leave your radiator uncovered on the coldest day—leave your car at night in an unheated garage—IT CAN'T FREEZE. Radiator trouble and worry is a thing of the past.

FOR SALE BY ALL DEALERS

S. C. JOHNSON & SON, Dept. MA, Racine, Wis.

RECOMMENDED BY THOUSANDS



Uncle Sam Uses Crawler Tractors

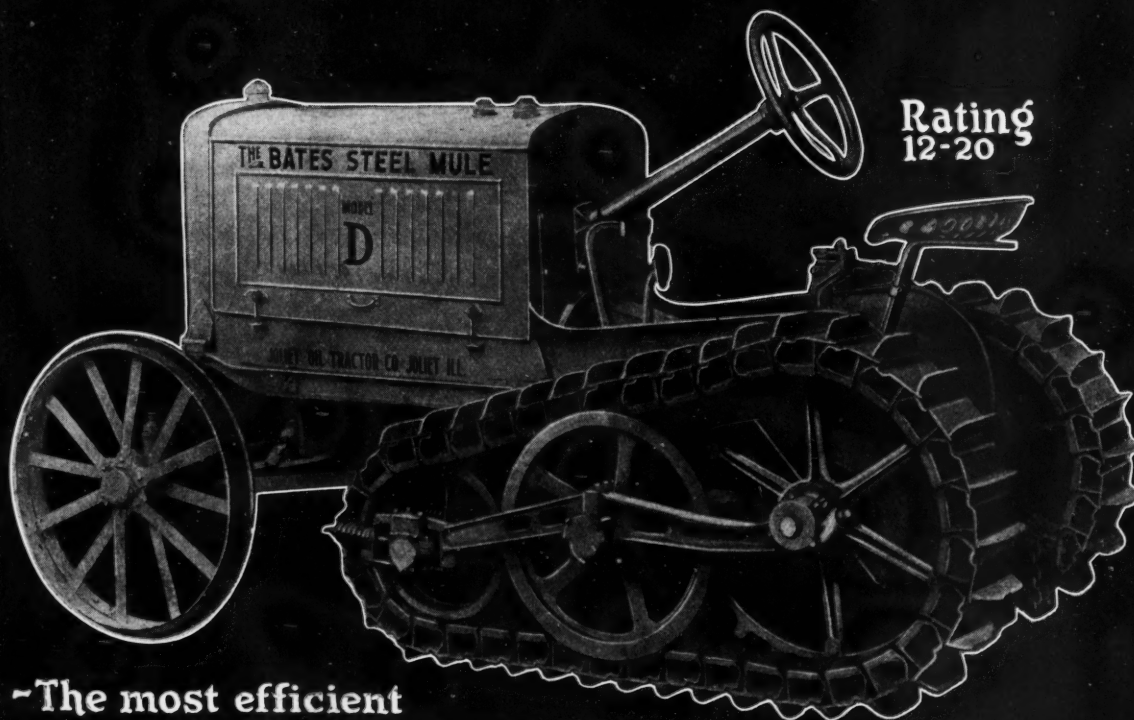
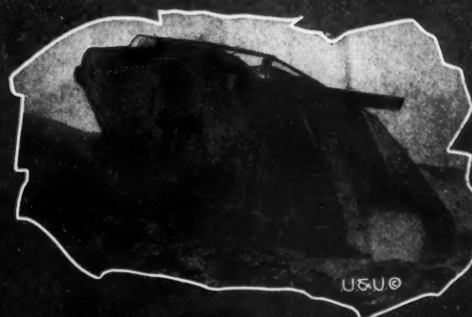
Perhaps the most convincing proof of the efficiency of the crawler type of drive is the performance of the "land battleships" in Europe, the war tanks. The way these go through everything and over everything is truly remarkable.

In Uncle Sam's war work he uses tractors of the crawler type because he knows that they have the reliability and pull to get there.

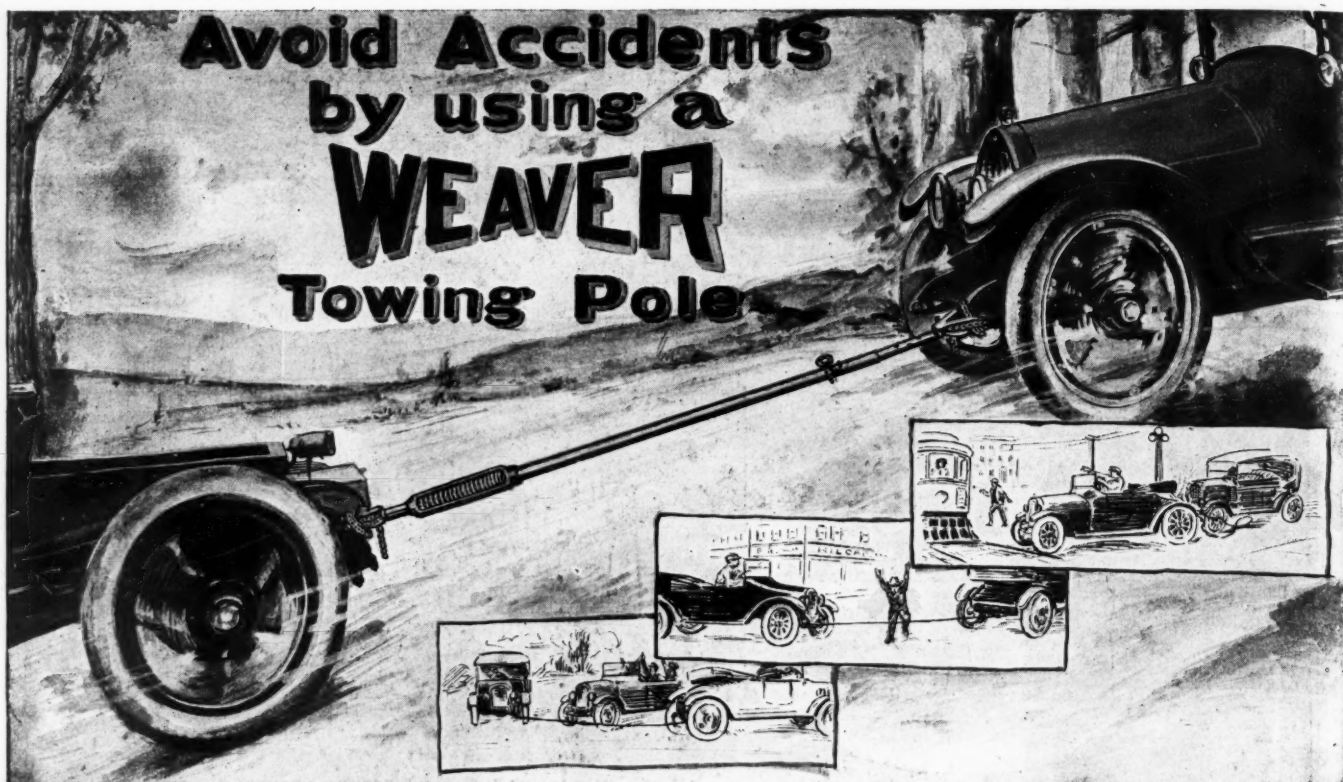
The powerful twin crawlers of the Bates Steel Mule grip any soil with a firm hold so that the heavy duty, valve-in-head kerosene motor need not waste an ounce of its power in uncertain traction.

The progressive dealer in your neighboring town may write us tomorrow for your territory. If you are a better man, why not write today?

JOLIET OIL TRACTOR CO.
437 Jackson Street Joliet, Illinois



~The most efficient
tractor in America~



Every year thousands of accidents occur to cars either towing or being towed.

THE MAIN CAUSE of these accidents has been the old-fashioned, flexible tow-line. When a short rope was used, sudden stops often meant that the towed car smashed into the towing car. This was especially true if the brakes of the rear car were out of order or failed to work instantly. Where a long rope was used to reduce the possibility of jamming, pedestrians have been tripped and run down, and another car coming suddenly out of a side street has on hundreds of occasions collided with tow-line. Anyone who has ever had to do with a disabled car will appreciate these conditions and realize the value of this new Weaver Appliance.

The Weaver Towing Pole is made of heavy, double strength steel tubing, and is adjustable in length from 5 ft. 6 in. to 8 ft. While the pole is sufficiently rigid to enable it to control the rear car, a coil spring, applied in such a manner as to provide tension both ways, absorbs all shocks from sudden starting or stopping.

To attach the Weaver Towing Pole is but the work of a minute. A 36-in. chain is employed to lash around the "V" shaped socket, and a heavy woven pad prevents either chain or socket from marring finish of car. Chain is held by a secure spring plunger.

Don't tempt fate any longer by using ordinary tow-lines. The damage caused by one small accident will cost more to repair than several Weaver Towing Poles, and the poles will last a lifetime.

Write NOW For Catalog describing this article and also the entire Weaver Line of SHOP EQUIPMENT. Modernize your garage by Weaverizing it and you will be able to lend many mechanics to Uncle Sam and still handle your usual run of business.

WEAVER MANUFACTURING CO., -- 2165-79 South 9th Street, -- SPRINGFIELD, ILLS.



THE WEAVER AUTO OILER



Does entirely away with the dripping measuring can and the dirty funnel. You fill the Weaver Oiler and place it alongside your gasoline tank. When a man wants oil, you merely twist the spout to conform to the position of the oil opening, press a button and watch the indicator till the desired amount is registered. Then you release pressure on the button and turn the spout back to its normal position.

Saves time, saves oil, guarantees accuracy, eliminates dirt. Both you and your customers will appreciate the Weaver Auto Oiler. Order one for every grade of oil you handle. Read its full description in our complete catalog.

MOTOR AGE

Published Every Thursday by
THE CLASS JOURNAL COMPANY
 MALLERS BUILDING
 59 E. Madison St., CHICAGO
 HORACE M. SWETLAND, Pres. W. I. RALPH, Vice-Pres.
 E. M. COREY, Treas. A. B. SWETLAND, Gen. Mgr.
 MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

Vol. XXXIV Chicago, December 12, 1918 No. 24

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MOTOR AGE

MALLERS BUILDING CHICAGO Phone Randolph 6960

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 Phone Bryant 8760

SUBSCRIPTION RATES

United States, Mexico and U. S. Possessions.	\$3.00 per year
Canada	5.00 per year
All Other Countries in Postal Union.....	6.00 per year
Single Copies	15 cents

Entered as second-class matter, September 19, 1899, at the Post Office, Chicago, Illinois, under Act of March 3, 1879.

Owned by UNITED PUBLISHERS CORPORATION, 243 W. 39th St., New York. H. M. Swetland, Pres.; Charles S. Phillips, Vice-Pres.; W. H. Taylor, Treas.; A. C. Pearson, Secretary.

"NORMA" PRECISION BALL BEARINGS

(PATENTED)



A machine, a mechanism, reflects the character of its builder. From the performance of that machine or mechanism, the user forms his estimate of the standards, the integrity, of the manufacturer. Inadequacy in some seemingly minor part evidences carelessness and neglect, and calls in question not only the worth of the machine but also the character of the man who made it.

Manufacturers of ignition apparatus and lighting generators using "NORMA" Ball Bearings fear no bearing troubles or failures. And builders of cars, trucks, tractors, power boats and airplanes carrying this high-grade apparatus fear no criticism due to trouble with their electrical equipment.

**Be SURE. See that your
Electrical Apparatus is
"NORMA" Equipped.**

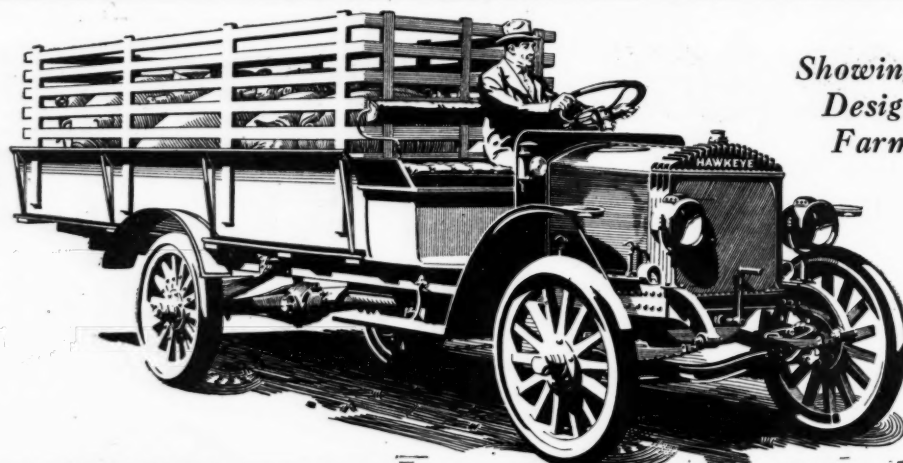


THE NORMA COMPANY OF AMERICA

1790 BROADWAY

NEW YORK

Ball, Roller, Thrust and Combination Bearings



*Showing Body
Designed for
Farm Work*

**15 Miles
an Hour
With a Full
Load**

IT IS easy to make claims, we realize, and many trucks have been extravagantly advertised. But if you will compare the specifications of the Hawkeye with those of any other high-grade truck in the country, we believe you will agree with us that we have reason for our claim—that the Hawkeye Truck is the greatest value for the price in America.

It is certainly the logical truck for dealers in Iowa, Minnesota, the Dakotas, Nebraska, and the far northwestern states, on account of quicker deliveries, less freight charges and the convenience of factory service.

HAWKEYE **MOTOR TRUCKS**

Motor—Buda 4-cylinder vertical, exceptionally heavy duty, built specially for truck service.

Governor—Simplex, with a maximum speed of 16 miles per hour.

Oiling System—Positive pump system with constant oil level pump mounted on side of crank case.

Carburetor—Zenith with automatic adjustment for all kinds of weather.

Ignition—Eisemann high tension magneto.

Cooling System—Centrifugal water pump and 16-inch fan mounted on ball bearings.

Control—Left hand drive, spark and throttle levers mounted under steering wheel. Foot accelerator, gear

shift and brake lever located to the right of the driver in center.

Clutch—Fuller model T U 3, dry disc.

Radiator—Cellular, with cast shell. Mounted independently from hood.

Transmission — 1½ ton, 3 speed Fuller heavy duty model T U 3. 2 ton, sliding gear, selective type, 4 speeds forward, 1 reverse.

Rear Axle—Clark internal gear type.

A Wonderful Truck for Farmers

The Hawkeye Truck is designed to stand the rough-and-tumble service required for farm operation. It is built low down, for easy loading, yet it has plenty of clearance for road and field. It also has plenty of speed and a surplus of power. Farmers will find the Hawkeye just the truck they need.

**TWO
SIZES**
1½ Ton \$1900
2 Ton \$2500

HAWKEYE TRUCK COMPANY, Sioux City, Iowa
R. A. BENNETT, President

Published Weekly
AT CHICAGO

MOTOR AGE

ESTABLISHED
1899

"The Foremost Motor-News and Maintenance Magazine"

TELL US ABOUT YOUR MAINTENANCE OR BUSINESS PROBLEMS: WE'LL GLADLY HELP YOU!

That, sir, has been our motto for over eighteen years; and last year we published and answered by personal letter over 13,000 inquiries about overhauling, repairing, ignition, rebuilding, wiring, etc.

You'll remember one book you and I used in our school days that was very much different than all others. It contained many a puzzling question, but it also published an answer.

Don't you remember how we could refer to the "back of the book" when we had a problem in arithmetic and there find our answer? Of course, we had to work out our problem, but you'll agree that the result had to be like the one in the "back of the book" before we knew it was correct.

In your line of business you still have problems to solve. Most of them are what might be termed "maintenance or mechanical" problems. They pertain to overhauling, repairing, wiring, rebuilding; in fact, everything that has to do with the service of cars, trucks or tractors. But—your "back of the book" is missing.

No matter what kind of a business or mechanical problem you experience, there's a solution; and there's a "back of the book," but with a different title, namely: "The Readers' Clearing House."

The Readers' Clearing House pages in this issue tell the story; they show how other men in your line of business are getting their "answers" and at practically no cost. It's part of a service MOTOR AGE gladly offers and which no other publication in the field has even attempted.

Is it any wonder that MOTOR AGE asks its friends to consider its service instead of the subscription price? It's an old saying that "You can't get something for nothing," and usually the man who considers price alone in buying gets even less than he pays for.

Every number of MOTOR AGE (and there are 52 in a year) contains from four to six pages of "Questions and Answers," in addition to the "Motor Car Repair Shop" department; "Service Equipment" department; "The Electrical Equipment of the Motor Car," Garage Management articles, an illustrated page of wiring diagrams, and beginning next month a set of specification tables every week.

Read the following pages and then decide that you, too, will get your share of the unusual service MOTOR AGE is rendering your trade right now. Why not have this service start for you with the New Year?

Very truly yours,

MOTOR AGE.

J. R. Hannon

Circulation Manager.

*A subscription to Motor Age makes
a dandy Christmas gift. J. R. H.*



**No change in the prices
of Nash passenger cars and trucks
before July 1, 1919**

IN offering Nash products to the public, we have never made price an issue. At this time, however, owing to the various price changes announced in the motor car industry, we wish to call your attention to the fact that Nash products at the present price represent unusual values. Nash prices have never been artificially raised, therefore there will be no change in the Nash prices before July 1, 1919.

THE NASH MOTORS COMPANY

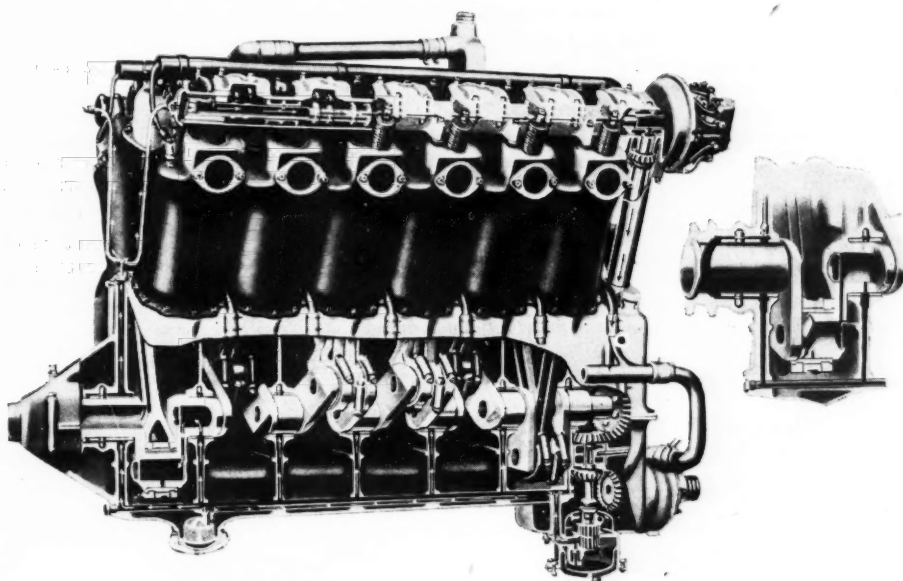
Nash Passenger Cars—5-Passenger Car, \$1490 4-Passenger Roadster, \$1490
4-Passenger Coupe, \$2250 7-Passenger Car, \$1640 Sedan, \$2250

Nash Trucks—One-Ton Chassis, \$1650 Two-Ton Chassis, \$2175
Nash Quad Chassis, \$3250
F. O. B. Kenosha

NASH MOTORS
VALUE CARS AT VOLUME PRICES

MOTOR AGE

More About the Liberty



Side view of Liberty engine cut away to show crankshaft, valve mechanism and oil flow. The small view shows the oil passages of the connecting rod

Facts About the Aircraft Engine Heretofore Unpublished—New Illustrations

ALTHOUGH the Liberty airplane engine was opposed during the first months of its production, it now has been accepted as representative of the highest class of engineering achievement. Heretofore details as to its construction have been strictly censored, and none but the main specifications could be made public. **MOTOR AGE** herewith presents some of the first details to be published. The story is released through the courtesy of the Bureau of Aircraft Production. Other details will appear from time to time in succeeding issues.

Engine Weighs 806 Lb.

The Liberty engine used in the De Havilland and other land planes and many seaplanes is a twelve-cylinder V-type with overhead valves and overhead camshaft. It weighs approximately 806 lb., and the horsepower ranges between 350 and 400 in the Army type with the high compression pistons and 320 to 340 in the Navy type with the low compression pistons.

The rated fuel consumption is 0.54 lb. a horsepower, or 36 gal. an hour with wide open throttle at 1700 r.p.m. Under serv-

ice conditions about 30 gal. an hour is fairly representative consumption. The oil consumption is 0.03 lb. a horsepower-hour, or 1½ gal. an hour with wide open throttle at 1700 r.p.m. The horizontal flying speed of the engine is 1700 r.p.m., and the ground speed is 1600 to 1625 r.p.m.

The engine has individual drawn steel cylinders with bore and stroke of 5 by 7 in. and a piston displacement of 1649.34 cu. in. The cylinders are bolted to the upper half of the aluminum crankcase, the two sets making an angle of 45 deg. with each other. The waterjackets are of pressed steel and are welded to the cylinders and at their own seam. An engine

in all respects identical with the Liberty aircraft engine, but having cast iron cylinders is used on tanks.

Valves in Head

The valves are mounted in the heads of the cylinders and are inclined at an angle of 15 deg. to the center line of the cylinder, so that the angle made by the center lines of the two halves is 30 deg. The intake manifold passes between the two rows of cylinders, and the carbureters in most of the installations are mounted in the V. The entire valve drive is housed above the cylinders and can be readily removed without tearing down the engine.

The pistons are of aluminum. There are two designs of pistons used, one for the Army type and one for the Navy. The Army-type pistons have a crowned head which gives an 18 per cent compression space. The navy type pistons have a flat head which gives a 20.5 per cent compression space. The pistons are 5 in. long and have three rings of the eccentric type, all at the top of the piston. These piston rings are assembled with a gap between the ends of the rings not less than .025 in.

Truck
Specifications
in
This Issue

The pistons of the engine weigh 3 lb. 3 oz.

A drop-forged seven-bearing crankshaft 2½ in. in diameter is used. The shaft carries a propeller hub at its forward end and at the rear end carries a bevel gear for driving the valve mechanism. A double row thrust bearing at the propeller hub end of the crankshaft takes the end thrust on the shaft. The shaft is drilled for oil passage, the openings being drilled through the crank cheeks through the crankpins.

Arrangement of Valve

The valve drive is arranged as follows: From the bevel gear on the end of the crankshaft motion is transmitted to a vertical shaft located on the distributor end of the engine, or the end opposite from the propeller hub. This shaft has an intermediate gear which engages with the two cam driving shafts running parallel with the center lines of the cylinder blocks. The vertical shaft, which carries the lower bevel gear and the intermediate gear, is carried on a single row ball bearing at the upper end and a single row ball bearing just above the bevel gear at the lower end. The camshaft driving shafts are carried on two single row ball bearings at their lower end and in a bronze bushing at the upper end.

The drive is taken from this point to a bevel gear on the end of the camshaft which actuates the valves. The valves are operated from the camshaft by roller cam

followers which actuate the rocker shaft and in turn the valve rocker arms. The valve rocker arms bear directly on the valve stems by an adjusting bolt directly on the ends of the valve stems. The valves are set into the cylinders on an angle of 15 deg. to the center line. The valves are the standard mushroom type with 45-deg. seat. The cylinder heads are bushed for the valves and the valve springs are of the double concentric type. The adjustment for the clearance between the end of the valve stem and the valve pushrod is made by turning the screw in the end of the rocker or pushrod and then locking it by the nut on the top of the rocker. This nut is locked by a cotter pin and is a castellated type. The clearance on the exhaust valve is 0.019 to 0.021 in. and on the inlet, 0.014 to 0.016 in.

The ignition system used on the Liberty twelve is the battery type with two independent breaker and distributor mechanisms, mounted on the ends of the camshafts, identical in every respect and each one firing all twelve cylinders. These distributors are supplied with electrical energy from two sources. For starting and idling speeds up to 650 r.p.m. current is drawn from the specially constructed four-cell storage battery which has sufficient capacity to ignite the engine at full speed for 3 hr. and is so constructed that it will

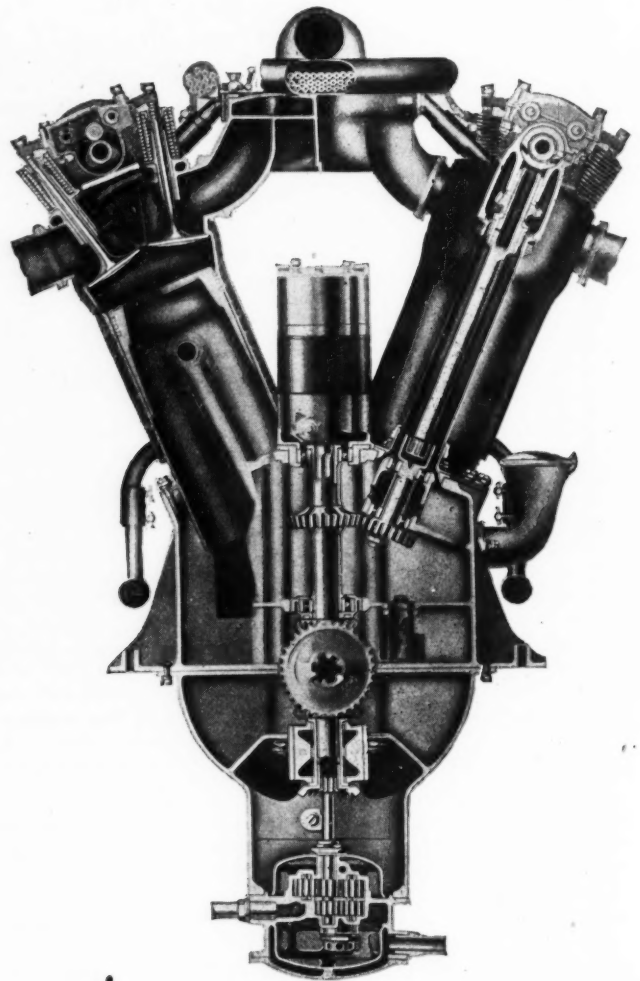
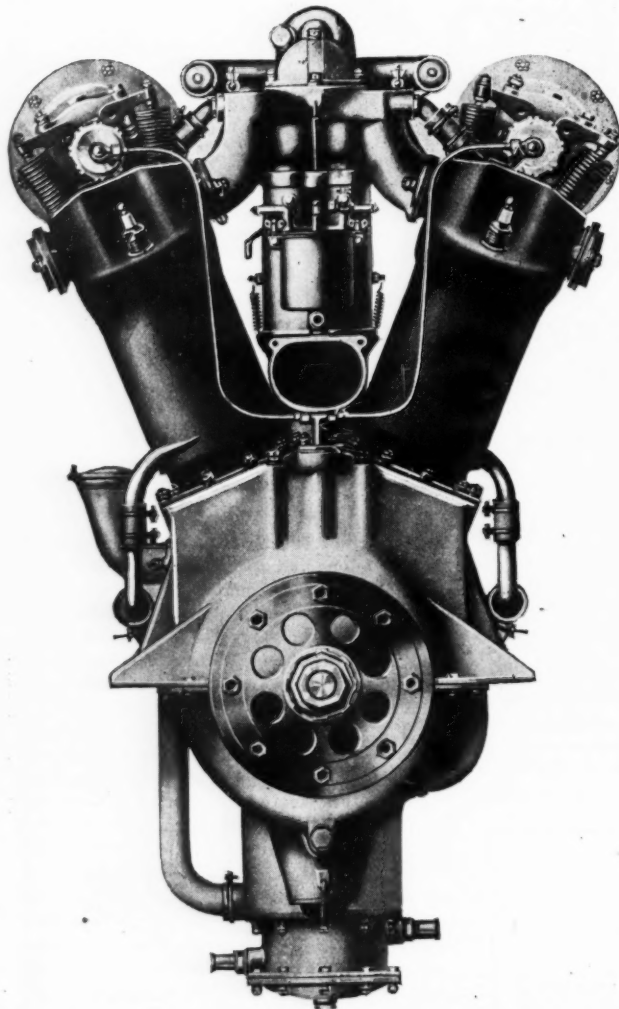
function properly upside down. The generator builds up so that it takes up the load at 650 r.p.m.

Two main circuit breakers connected in parallel are located in each distributor box and the two circuit breakers are timed to operate simultaneously. Circuit breakers are provided in duplicate as a precautionary measure. There is also an additional circuit breaker to prevent the production of a spark when the engine is turned backward or rocked.

Oil Is Cooled

The oil supply for the Liberty engine is carried in a reservoir which is cooled. This reservoir is mounted somewhere in the vicinity of the engine and from it oil is led to the connection on the right side of the oil pump body which is marked in raised letters, Oil In. The oil is filtered at this point through a large-area, fine mesh screen. A delivery pump of the gear type takes the oil after it has passed through the screen and delivers it under pressure to a distributor pipe running the entire length of the crankcase. There is a pressure regulating valve between the pump and the distributing pipe which holds the pressure so that it does not exceed 50 lb. per sq. in.

From the distributor pipe there are pipes fitted in the crankcase leading to the main crankshaft bushings. The crankshaft is



The propeller end and the opposite end of the Liberty airplane engine appear here. At the left is shown the arrangement of carburetor and manifold, while at the right is shown the piston, valve mechanism, ignition distributor and oil pump

hollow, and in the center of each main bearing there is a radial hole drilled through the shaft into the hollow center. A passage leads from each hollow main bearing to the adjacent crankpin, which is also hollow. A radial hole is drilled through each crankpin and carries the oil out on the surface of the pin. There are oil grooves and passages in the connecting rod bushings to insure proper lubrication for both the forked and plain connecting rods.

Once every revolution of the camshaft a small quantity of oil is forced into the hollow camshaft. The oil is led through the camshaft and out through holes drilled in it to each camshaft bearing.

Cooling by Pump

Cooling water is circulated through the Liberty engine by a centrifugal pump running at one and a half times engine speed. The capacity of this pump is 100 gal. a minute at 1700 r.p.m. The cooling system from the pump inlet to and including the water outlet header will hold $5\frac{1}{2}$ gal. of water.

Two duplex Zenith carbureters are used on the twelve-cylinder Liberty engine. This is equivalent to four single carbureters, each one supplying three cylinders of the engine. Each duplex carbureter consists of a single float chamber and a single air inlet joined to two separate and distinct spray nozzles, venturi and idling devices. Each of the two barrels of each carbureter is fitted with a throttle valve of the butterfly type. The two pairs of throttles are operated simultaneously by a shaft, provided with an adjustment at each end by which the pairs may be synchronized. Each duplex carbureter is fitted with an altitude adjustment.

At an altitude of about 6000 ft. the aviator will begin to open a valve, drawing air from the float chamber and establishing therein a partial vacuum which depends on the degree of opening a stop cock. This partial vacuum will impede the flow of gasoline through the jets, and the mixture will be made more lean.

LARGEST SEAPLANE IN THE WORLD

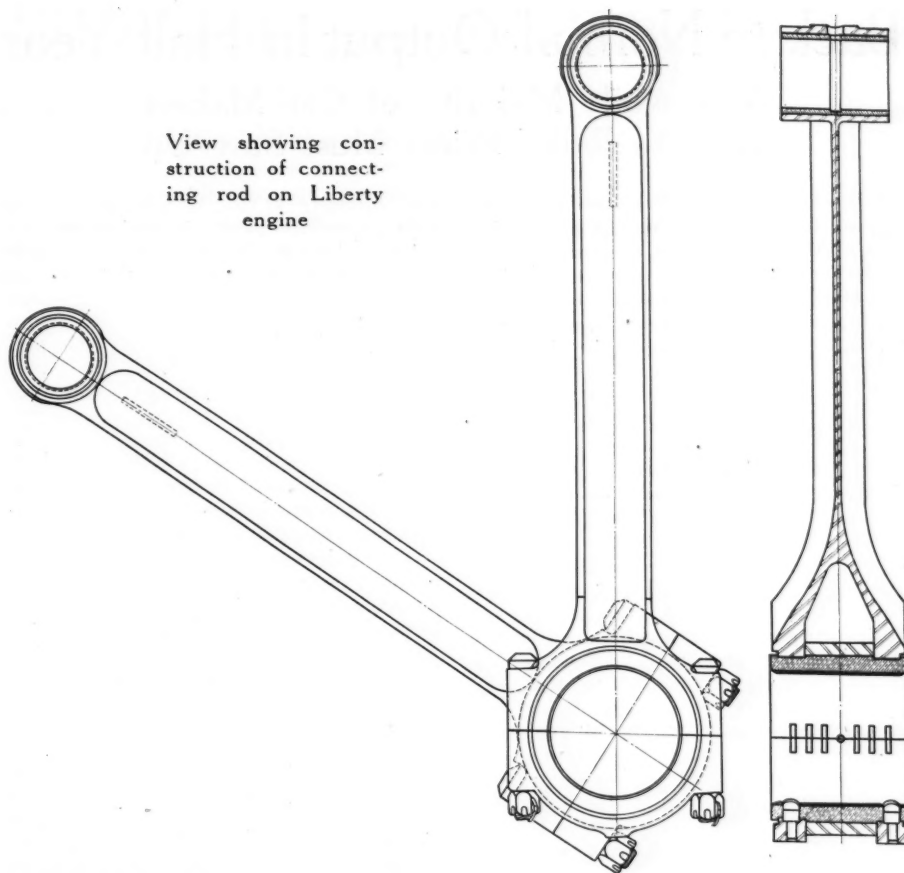
Washington, Dec. 6—The giant NC-1, the largest seaplane in the world, which made a flight with fifty men on board, as reported in last week's issue, is the first American tri-engined seaplane propelled by three Liberty engines that develop a maximum of 1200 hp, giving it a cruising speed of 80 m.p.h. The flying weight of the machine is 22,000 lb., while the weight of the seaplane itself, unloaded and without a crew, is 13,000 lb.

An idea of the size of the seaplane is shown by the fact that the wing spread is 126 ft., the breadth of wing 12 ft. and the gap between wings 12 ft.

Recently the NC-1 made the trip from Rockaway to Washington, about 350 miles, in 5 hr. 20 min. The flight from Washington to Hampton Roads, 150 miles, was covered in 2 hr. 15 min., and the trip from Hampton Roads to New York, 300 miles, took 4 hr. 20 min.

PLANES FOR POSTOFFICE

Washington, Dec. 6—The War Department turned over 100 De Haviland 4 and twelve Handley-Page airplanes to the



View showing construction of connecting rod on Liberty engine

Postoffice Department Wednesday for air mail service. The De Haviland planes can carry 400 lb. of mail and can be altered to carry 1200 lb. if necessary. The Handley-Page planes can carry more than a ton. The New York-Chicago airplane route has been slightly changed in the plans for it, and Elizabeth, N. J., has been announced as the return terminus. Bellefonte, Pa., is the first regular stop; Leighton, Pa., the first emergency landing station, and Cleveland, the next stop, with an emergency station at Clarion, Pa. The last stop before Chicago is at Bryan, Ohio, where mail will be discharged and taken on.

AIR SERVICE ESTIMATES

Washington, Dec. 6—Appropriations for the current year submitted to Congress by Secretary McAdoo included \$144,943,000 for the Air Service as against \$760,000,000 last year.

NON-STOP AERIAL FLIGHT

Washington, Dec. 6—Maj. N. J. Boots, Army pilot, made a non-stop flight of 500 miles from Mount Clemens, Mich., to New York last week in 4 hr. 30 min. He used a De Haviland 4 with a Liberty engine and one extra 25-gal. gasoline tank. The supply of gasoline in the extra tank was not used.

NEW MONOPLANE DESIGNED

Washington, Dec. 6—Announcement of a new airplane—the Loening two-seater monoplane—has been made in Washington, together with the information that this monoplane has developed 145 m.p.h. with a full military load, including four guns,

which is in excess of any record made by a European single-seater combat machine. The Loening plane in its tests also climbed to 25,000 ft. in remarkable time, which has not been made public, carrying two passengers, thereby establishing another new record.

The plane is American designed and American built. It is smaller than the De Haviland 4 and weighs only 2400 lb. loaded for the air, which is practically the weight of a single-seater scout. It is driven by an eight-cylinder 300-hp. Hispano-Suiza. The power plant is a unit construction and easily can be removed from the body of the plane. There are several original ideas in the under strutting. The arrangement of the seats provides the pilot with 50 per cent more vision than any other combat machine produced prior to or during the war. The plane carries sufficient fuel for $3\frac{1}{2}$ hr.

Grover Cleveland Loening, the designer and builder, is an American, an aero engineer with eight years' experience and the author of several textbooks used by American flying cadets. He is connected with the Loening Aeronautical Corp., Long Island City, N. Y.

285 MILES IN 2 HR.

Washington, Dec. 6—From Washington to New York, 285 miles, in a De Haviland airplane in 1 hr. 55 min. was the record attained yesterday when Maj.-Gen. William L. Kenly, director of the Division of Military Aeronautics, made the journey with Maj. W. C. Ocker as pilot. They left Bolling field, Washington, at 10:20 a. m. and arrived at Garden City at 12:15 p. m.

Back to Normal Output in Half Year

Meanwhile Majority of Car Makers Hold to Belief Prices Must Stay Up

CHICAGO, Dec. 9—Three cars are added to those who think best to make price increases just now. But the consensus as to the general stationary tendency of prices still stands firm in the industry as a whole. Naturally, the public favors a general decrease in prices, although this view certainly is not entertained by those who now are buying the labor and materials that go to supply their demand for cars and trucks.

The price situation is slightly clearer, though still likely to cause doubt on the part of the buying public which may result in later business than otherwise could be expected. Reports from different parts of the country would seem to indicate that dealers in general are having pretty good business right now, and with most of the larger cities planning business-getting shows for the next few months, there appears to be every chance that business is going to be good and better all the time. Some of the prospects who tentatively bought cars during the pre-peace days and later canceled their orders are sure-fire prospects now, with many of them already enrolled in the lists of the car owners.

Return to Normal Slow

As for the factory's side of the price question, each factory is having its own problems to work out just now, with some of them still on war work, others at the end of a war contract-less period and a decreasing stock of materials, etc. Some of the plants which have been devoted almost exclusively to war work, with consequent reduction in car output, made several sharp advances in price, and these are expected to be let down to some extent as production increases. However, it must be remembered that the return to normal production—let alone increased production—is not a matter of a few days, a few weeks, or, in some cases, even of a few months. Ford does not expect to get back to 3000 a day for three months.

Labor and materials will remain problems for the factory for some time, judging from all indications. When even the most ordinary materials, such as staple groceries, candies, butter and a host of others, offer no prospects of lower prices in the near future, according to the directors of their destinies, materials for cars and trucks offer no better prospects. There is little prospect of materials going down soon, and labor says it won't go down, so there you are.

The whole situation is dependent more or less on the costs of doing business in the few months following the war, and it is hard to say just what these will be.

The three cars whose price reductions were announced after last week's issue are Mitchell, Overland and Allen. Mitchell is offering the D-40 for \$1,275, a reduction of \$190, and the C-42 for \$1,525, a reduction of \$210, or an average reduction of \$200. Allen has revised its price so the touring

car, formerly \$1,295, is now \$1,195; the sedan, formerly \$1,795, is now \$1,695.

The Willys-Overland Co. has decreased the prices of all its models, excepting the 88 eight-cylinder passenger car. The new price list follows:

Model	New price	Old price
90, touring	\$ 985	\$1,095
Willys—6 touring	1,625	1,775
88-4	1,725	1,925
90, Sedan	1,495	1,665
88-4, sedan	2,750	2,950
88-4, coupe	2,650	2,850
90, delivery	1,000	1,045

As the war tax is figured in the dealers' costs, the new schedule will mean a corresponding reduction in the tax.

"The prices we announce now are experimental," says Mitchell. "They are based on pre-war costs. They are possible now because most of the materials we are using were bought at pre-war prices. We stocked up heavily two years ago on steels. Some parts, like tires, are costing much more, but for a few weeks we are going to stand that loss.

"But the steels we bought at pre-war prices will soon be exhausted. So with leather, so with other things. What these materials will cost after Jan. 1 is yet to be determined. If they come down—down to pre-war prices—we can continue the prices announced now. If they stay high, our prices must go up.

"During war time Mitchell prices advanced much less than others. The average on touring models was \$200. The reason lay in vastly reduced production. We turned our factory on to war work until in late months we were running almost exclusively on trucks. Selling costs—ours and dealers'—could not be reduced with output. Nor could overhead cost. So we had to get higher prices."

"We realize that the present situation on both materials and labor does not warrant this change," says Allen, "but felt the interests of the company and of the dealer organizations would be best served by establishing at this time a definite price for the 1919 season.

"As we approach a more nearly normal manufacturing program we feel this reduction will take care of itself and, if this is true, believe it is only right that the present purchaser of a car, as well as the one six months from now, should share in any possible saving."

The general opinion, however, is that present prices will have to continue more or less in effect for the next six months at least. Mercer gives this as its opinion and bases it on the fact that the cost of labor is very high and there seems no possible chance of its being decreased very greatly for quite a period.

Maxwell and Chalmers dealers and distributors have been assured that there will be no reduction in prices on these two cars before July 1, 1919. In case there should be a reduction, the company will protect them on all unused new cars in their possession at that time.

Kissel prices are to remain stationary "until a reduction is justified by a corresponding reduction in costs," the company writes.

Maibohm expects no reduction in prices during 1919 and is protecting its people against the possibility of such a decline. Pan-American does not expect a reduction "as the price on all materials of the character that is used in manufacturing automobiles is continuing to advance." Bartholomew sees no present indication of a price reduction for labor and materials and does not think reductions in the prices of cars are justified at this time. The Baker R. & L. Co. does not expect any reduction for six months at least.

Tower sees no material reason for reducing its truck prices, while the Available Truck Co. will not for six months at least.

PHILADELPHIA TRUCK SHOW

Philadelphia, Pa., Dec. 7—The Motor Truck Association of Philadelphia has decided it will hold a show in March, following the show of the Philadelphia Automobile Trade Association. The truck show will be held under the direction of a committee consisting of the officers and directors.

KANSAS CITY SETS DATE

Kansas City, Mo., Dec. 7—Feb. 24-March 1 has been decided on as the date for the Kansas City motor car show. It probably will be held at Convention Hall, and trucks are to be given more space than formerly.

The fourth annual tractor show will be held in a temporary building, steam heated and electric lighted, on the Union Station Plaza, Feb. 24-March 1, at the same time as the motor car show. There will be a 90,000 sq. ft. of floor space, an increase of 50 per cent over last year.

MILWAUKEE SHOW DATES

Milwaukee, Wis., Dec. 9—Jan. 24-30 has been selected by the Milwaukee Automobile Dealers, Inc., for the eleventh annual Milwaukee show, to be held in the Auditorium.

N. E. Osmond, head of the Osmond Motor Car Co., Chalmers and Winton dealer, has been appointed chairman of the show committee. Assisting him are: Ray C. Chidester, manager Milwaukee Packard branch; Alfred Reeke, Nash; Leslie D. Frint, Oldsmobile and Oakland, and A. W. L. Gilpin, manager Milwaukee Ford branch. Bart J. Ruddie is manager.

NEW YORK DATES

New York, Dec. 10—Special telegram—New York show will be held in Madison Square Garden—passenger cars, Feb. 1-8, and trucks, Feb. 10-15. Balconies will be built as at previous Garden shows.

LOS ANGELES SHOW DATES

Los Angeles, Cal., Dec. 6—The Los Angeles Motor Car Dealers' Association has voted to hold a show Dec. 25-Jan. 1. Dealers are hoping for great things in return for the show, and unless they materialize there will be a mightily disappointed

organization here. Something that will put pep into the buyers of motor cars is needed, and the show has been decided upon as the thing.

There is an ample supply of new cars in storage here. Conditions are such that the dealers feel if they can once get the buying spirit back into the public 1919 will become a year of profit instead of loss. All kinds of producers in southern California have had a profitable year. Ranchers have been paid more for fruits, vegetables, hay, grain and beans than ever in history. A tremendous amount of money has been paid into this section of the country in exchange for the walnut crop.

MONTREAL CONSIDERS SHOW

Montreal, Canada, Dec. 6—A straw vote taken during the last week shows two-thirds of the local dealers strongly in favor of the annual show being held in this city around the middle of February. Many of the others will not express an opinion until they have definite instructions from their factories, and it is a noteworthy fact that there are very few of the local dealers who openly state that they are entirely opposed to a show this season.

The two reasons which are at present the burning questions are, first, that there will be no new models and, second, on account of the doubt about the present embargo on the importation of cars into Canada over the value of \$1,200 being lifted. The first question is answered by the fact that the usual big schedule of shows is being arranged all over the United States.

With reference to the embargo on cars of \$1,200 value and over, arrangements can be made whereby exhibition cars can be brought into Canada in bond for strictly show purposes. Similar bonding arrangements as these were made at the recent Toronto exhibition, which enabled all the cars valued over \$1,200 to be shown there without interfering with the existing embargo.

1919 Ford Cars Will Have Starters

Liberty Device to Be Standard Equipment Without Any Extra Charge

DETROIT, Dec. 7—The new Ford cars are to be equipped with an electric starter. No additional charge will be made for the starter, which will be standard equipment for 1919 on as many cars as the output of the starter plant will permit. It is possible this may be fitted only on the closed cars at first.

Rumors to the effect that the Ford Motor Co. contemplated a change of this kind have been current many times during the last two years. At one time it is known a starter actually was developed and negotiations carried to the point where its equipment on all Ford models practically was assured. Later, however, difficulties arose which precluded the possibility of its addition.

The starter to be used is one developed and now in production by the Liberty Starter Co., which was organized originally to build starters for the Government and obtained a contract for 16,500 of them. Some of these have been furnished for use on Government tanks and other automotive equipment for the American Expeditionary Forces. The Government contract has been canceled, and it is understood the Ford Motor Co. has contracted to absorb the entire output.

The Liberty Starter Co. occupies a factory of modern size, and its present output is approximately 500 a day. Another building of the same size is to be built immediately and the output more than doubled.

Present production at the Ford plant is 1000 a day, but it is expected to reach 3000 in ninety days. The company has unfilled orders for 50,000 cars. No change in prices is contemplated at present. The assembly

plants on Long Island and at Minneapolis will be opened as soon as they are released by the Government. The Des Moines plant will not be opened for some time, although it has been released.

Fordson Price Unchanged

Detroit, Dec. 9—A 100 per cent attendance of Fordson distributors attended the sales conference at the Fordson tractor plant in this city on Thursday, Friday and Saturday of last week. More than 100 distributors and executive men in their employ were here. The conference was devoted almost exclusively to an open discussion of the prospects for the coming year and the policy which would be pursued by the distributors' association in handling it. No definite action was taken on many of the things affecting policies, but committees were appointed from among the members of the association which will take these matters under investigation and report conclusions to Henry Ford & Son for final decision.

Probably, as far as the distributors are concerned, the official recognition of the association by Henry Ford & Son was the most important outcome of the conference.

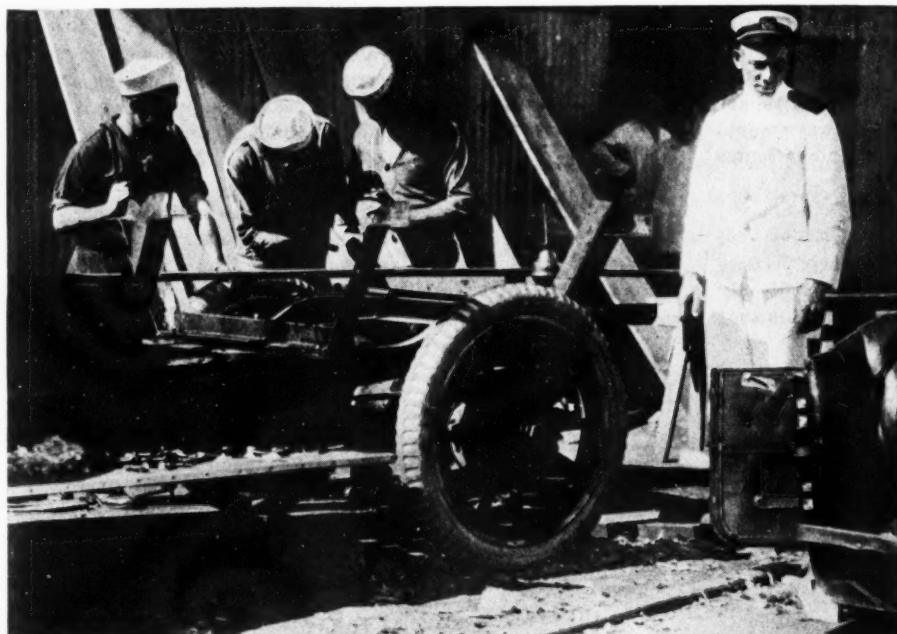
C. E. Sorensen, in addressing the conference, said that Henry Ford & Son were heartily in accord with the principles underlying the organization and that henceforth it should receive the approval and hearty co-operation of the company. Matters affecting the distribution of the tractor will be referred to the association and handled through committees subject to the approval of the officials of Henry Ford & Son, who are recognized as honorary members of the association and who constitute practically an executive committee with final authority.

It was decided at the conference that there will be no immediate change in the price for the Fordson tractor, which will continue at \$750, f. o. b. Dearborn, Mich., as heretofore. About the only change from past custom in this respect was the agreement by Henry Ford & Son to ship tractors in earload hereafter, payable upon delivery and not with sight draft attached to bill-of-lading, as has been the custom.

The consensus of the distributors was that free service should be limited practically to delivery and starting the tractor with preliminary instructions of the farmer in operation. Subsequent service to be charged for at rates depending upon local conditions. The recommendation was made that in all cases where it was necessary to supply spares, the local service man make an investigation to determine whether the breakage was due to the fault of the operator or to mechanical defects. This would determine the charge which should be made.

Regarding the equipment which will be used with the tractor, while it was not made conditional upon the distributors,

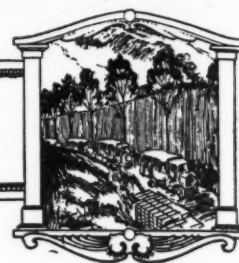
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Lest we forget—Some of our fighters are in Siberia these days. This shows American sailors working on a motor car



EDITORIAL



John Jones' Road

IT is a matter for surprise that business men of as broad experience and as much affected by motor car and highway interests as the oil industry should take the stand that was taken by the National Petroleum War Service Committee at Atlantic City last week. At the group meeting of the Oil and Oil Products group, under the chairmanship of A. C. Bedford, chairman of the board of directors of the Standard Oil Co. of New Jersey, the oil industry went on record as against Federal road-building. It did favor the construction and maintenance of highways under local supervision and by local taxation. The action was taken in the form of a resolution opposing the building of highways by the Federal government until the constitution is changed, giving more power to the highways commission, and urging that for the present highways built and the roads improved be selected by the localities involved.

MOST of the other 300 industries officially represented at Atlantic City Reconstruction Congress urged a strong Federal road-building program, some of them urging a special cabinet officer for the purpose. The economic importance of an uninterrupted policy with regard to public works and particularly in the building and maintenance of national highways was one of sustained interest at the convention. The hearty applause which greeted both Charles M. Schwab and Secretary Redfield, when they separately advocated the necessity of a comprehensive road-building program in order that the fullest possible use may be made of highway transportation, left no room for doubt on this point.

IT is doubtful if the oil men, or the one or two other groups in which discussion of the resolution evoked opposition to Federal road-building, can be set down as opposing road improvement. Such does not seem to be the case. The whole difficulty seems to be the fear that, should a comprehensive road-building program be undertaken by the Federal government, political log-rolling, sectional considerations and similar errors of politicians who might have a hand in the laying out of the highways would militate against the wisest expenditure of the money along routes where it would do the most national good.

HOWEVER, the arguments put up by these opponents of Federal road-building were anything but strong. Their premise that road improvement is a local matter and one of benefit only locally was exploded long ago. Their conclusions from this that

the cost of road improvement should be borne by only those directly affected, that is, in whose locality road improvement is made, is no more logical. Their contention, carrying the logic further, that inasmuch as the benefit would be local and the cost applied locally, that the roads should be laid out by the localities effected, while logical enough in the premises, leads to a conclusion which shows the utter absurdity of the whole proposition.

IT seems hardly necessary to point out that the benefits of road improvement are broader than local. The improvement of any road anywhere to an extent benefits the state and the Nation. Had it not been for the national-improved local roads of France, the Germans would have been in Paris in 1914, and probably in London by now. The benefits to a nation are no less definite in peace than in war. But, if we should carry the idea of local determination of roads to be improved to its logical conclusion, we would have a condition worse than in many states now.

IN many states the major unit of road taxation and road supervision is the county. In some we have adjoining counties, one of which has improved its roads in a comparatively thorough manner, while the next has done nothing. Perhaps, the next but one has likewise improved. For any inter-city travel, or any complete form of inter-city express, rural express, or motor transport freight systems, such road improvement is little less than useless. In other sections, where adjoining counties have improved their roads under county supervision, the road improvement in one county does not connect with the improved roads in another county. So, while a large sum has been expended in each, there is no means of getting from one county to the next.

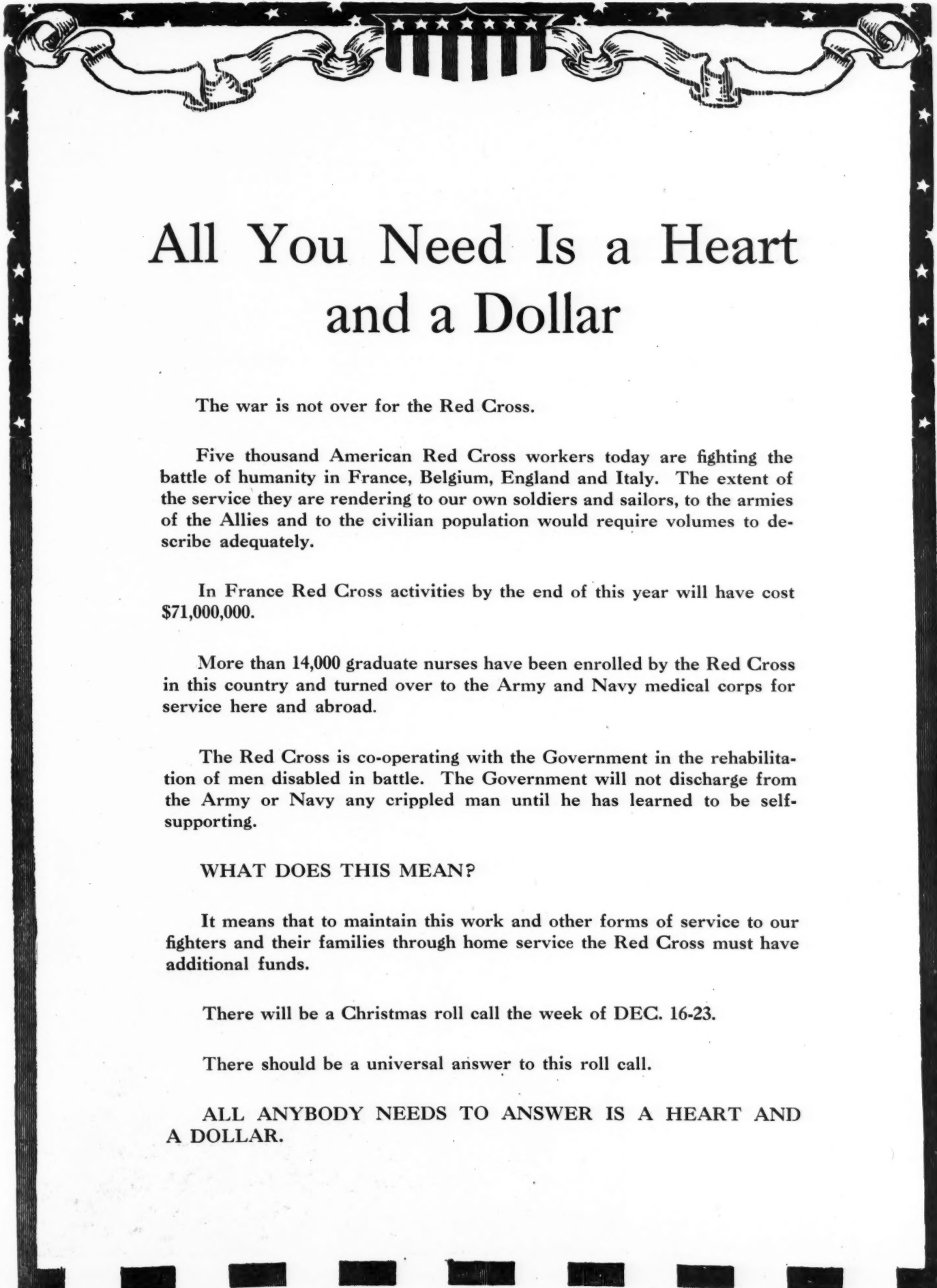
IT is not to be assumed that the logic of the opponents to Federal road-building can stop automatically at the county or the township. It would be just as logical to say that inasmuch as the road most directly benefits the man whose property it passes, consequently he should pay for the road, and inasmuch as he pays for it he should be the man to lay it out, determine the route and supervise its construction. It will not be difficult to imagine the conditions of travel through a territory where roads are so constructed. John Jones' road would run from his farmhouse to his 40-acre field and end in mud, and a half mile farther on, Farmer Brown would build his road from his front door to the end of his property. Chaos!

Reconstruction Lesson

THERE is a lesson for dealers in the great convention of the war service committees under the auspices of the United States Chamber of Commerce at Atlantic City last week. More than 5000 of the broadest and biggest business men of America spent the week in the discussion of the problems brought to their industries by the reconstruction period. The statement of their problems and the suggestions for their solution came through addresses by the leading men of industries and the Government. Their idea of the proper solution of these problems took the form of resolutions. Every one of the 381 war service committees, representing as many industries, were urged in addresses and

voted in resolutions to continue throughout the reconstruction period, and probably indefinitely, the associations of their industries fostered by the Government as a war means.

THE motor car trade well can take a lesson from the Atlantic City conference. There is need for greater organization and greater coöperation among its members. For their own benefit, in settling their own individual problems among themselves, and for bringing their influence to bear in order that their rights may be recognized by other portions of their own industry, by the Government and by industry as a whole.



All You Need Is a Heart and a Dollar

The war is not over for the Red Cross.

Five thousand American Red Cross workers today are fighting the battle of humanity in France, Belgium, England and Italy. The extent of the service they are rendering to our own soldiers and sailors, to the armies of the Allies and to the civilian population would require volumes to describe adequately.

In France Red Cross activities by the end of this year will have cost \$71,000,000.

More than 14,000 graduate nurses have been enrolled by the Red Cross in this country and turned over to the Army and Navy medical corps for service here and abroad.

The Red Cross is co-operating with the Government in the rehabilitation of men disabled in battle. The Government will not discharge from the Army or Navy any crippled man until he has learned to be self-supporting.

WHAT DOES THIS MEAN?

It means that to maintain this work and other forms of service to our fighters and their families through home service the Red Cross must have additional funds.

There will be a Christmas roll call the week of DEC. 16-23.

There should be a universal answer to this roll call.

ALL ANYBODY NEEDS TO ANSWER IS A HEART AND
A DOLLAR.

Iowa Expects to Lead in Tractors

Dealers Look for Greatest Number per Capita as for Cars

DES MOINES, Iowa, Dec. 6—Iowa is due for the same development in the tractor field that she has reached as a motor car-owning state, which incidentally is first.

This is the opinion of tractor dealers, implement men and motor car dealers who have just closed the first tractor show ever held in the state.

There were some very disappointing things about the show just closed, most important of which was the damage to attendance caused by the influenza, which has swept the state during the last six weeks and reached its height in Des Moines during the days of the show. While under the circumstances the attendance was very satisfactory, hundreds of Iowa implement dealers who ordinarily attend the annual convention of their associations were kept at home either by sickness in their families or fear of traveling when the epidemic was so prevalent.

The influenza conditions caused the show to be brought to a close two days earlier than scheduled, as it was thought there would be no out-of-town arrivals after Thursday and that the show had accomplished all that could be hoped for this year.

Better Show Next Year

In spite of these disappointing features, there is no question that the show will serve as a nucleus for a bigger and better show next year.

The show was held directly under the auspices of the Iowa Implement Dealers' Association, and simultaneously with the show the implement dealers held their annual convention in another part of the coliseum.

The Implement Dealers' Association received full support from the tractor dealers of Des Moines, including not only several motor car dealers but most of the threshing machine distributors who handle tractors. It was primarily a business show, and no attempt at elaborate decorations or entertainment features were attempted. The decorations, however, were very satisfactory, and an army band from Fort Des Moines played each afternoon.

No admission fee was charged, and the expenses of the show largely were covered by the sale of space in the coliseum. Booths 21 by 10 ft. were sold to the exhibitors for \$65 and there were about sixty exhibitors, some few of which were general implement concerns and did not show tractors. T. F. Wherry, Hampton, Iowa, secretary of the Implement Dealers' Association, was manager.

Discussion of service for the tractor dealers furnished the most important part of the program during the convention. One entire afternoon was given over to the discussion. The matter of free service was debated at length, and it was finally agreed to continue free service until the farmers had thoroughly learned their tractors.

The dealers represented in the discus-

sion felt that free service was the best advertisement they had as it was an assurance to the prospective buyer that he would be taken care of. However, the dealers agreed without dissension that the question of labor charges for repairs and new parts should be strictly on a paid basis.

Considerable time was spent in discussing who the best party to handle tractors was. The implement dealers, of course, claimed that their experience with gas engines particularly fitted them for the work in spite of the fact that the motor car dealers' sales organization were admittedly better. However, as there were 100 implement dealers to every five motor car dealers in the convention, there was little room for the motor car men.

In Iowa at least this case seems to be a three-sided affair. The implement dealers, particularly in the small towns, feel that the tractor field is their own particular property. However, during the last eighteen months, with the motor car industry temporarily curtailed by war time restrictions, many of the more progressive motor car sales forces have entered the tractor field and with their established sales methods have gained considerable headway.

Then there is the third factor, the thrasher dealers who take issue with both implement men and motor car dealers. In Iowa there is a state threshermen's association which at its annual convention in Des Moines has from 2500 to 3000 men from all over Iowa. A majority of the members are farmers, and the thrasher dealers of Des Moines claim that a show put on by the threshermen's association, where a very large per cent of the attendance is from the farmer, the prospective

purchaser, a far greater business can be developed than from a dealers' show, be it implement or motor car.

The Des Moines threshermen's club is now considering holding an exclusive tractor show at the annual convention in February.

Both the thrasher dealers and the motor car men taking part in the Des Moines show agree that the dates for the show this year were too early and hold that as a business getter the show would be much more successful in late February or early March.

All factions in the field are agreed upon the question, however, that Iowa is due as a tractor state. The Hawkeye state for years has led in food production and with the labor shortage and farm animal shortage as acute as they both are, they look for the tractor to be the all-important factor during the next few years.

IMPLEMENT DEALERS MEET

Peoria, Ill., Dec. 6—Optimism and a large attendance marked the nineteenth annual convention of the Illinois Vehicle & Implement Dealers' Association here Dec. 3-5. The principal cities of the state were represented, and the array of exhibits was in excess of all former years, the display of trucks and tractors and power farming machinery of all kinds being complete and varied. The business sessions and conferences were held at the Jefferson hotel. A question box was an instructive feature and produced much important discussion. There were also talks by leading members.

The address of T. N. Witten, of Trenton, Mo., upon the subject: "How Peace Will Affect the Implement Business," was one of the most important. He asserted that the coming five years would be the most important and the most critical in the history of the nation and the implement dealer must take his part in the procession. The responsibility of feeding the entire world rests upon the American farmer, he said,



The car is that of German officers revealing location of mines in accordance with the armistice terms

and it is up to the implement manufacturers and dealers to stand behind the farmer and see that he is equipped with adequate machinery to produce the maximum of grain.

"Be real merchants," he urged the dealers, "Get out of the storekeeper class."

J. B. Bartholomew, president of the Avery Co., also gave an instructive talk. In referring to the tractor, he said: "The idea of power farming is a live proposition. The tractor and tractor drawing implements will produce the food of the world. The reason that the American farmer to-day is wealthier than the European farmer is because he farms mechanically."

Secretary Addresses Dealers

W. L. Derry, Vermont, Ill., secretary of the association, told the dealers of a roseate future for them in the tractor and truck business. He declared that the tractor trade rightfully belonged to the implement dealers and argued that they were making a big mistake if they permitted the passenger car dealers in their territory to take such trade. M. C. Davenport, Lovington, Ill., read the report of the national federation. There was a general discussion of association work and other subjects of interest to the trade. Peoria was voted next year's convention place, and new officers elected as follows: President, W. S. Kellar, Quincy; vice-president, O. T. Meyers, Illiopolis; secretary-treasurer, W. L. Derry, Vermont.

Race Set for Indianapolis May 30

Hoosier Speedway Will Stage
500-Mile for \$50,000 Purse

CHICAGO, Dec. 9—Indianapolis is coming back with a 500-mile race May 30. The announcement has been made by C. G. Fisher, J. A. Allison and A. C. Newby, owners of the speedway.

The last big race at Indianapolis was May 30, 1916. This will be the seventh annual International race, with a purse of \$50,000. Most of the countries represented in former International sweepstakes to-day are listed among the Allies, and it is expected that with an International sweepstakes in which France, England, Belgium and Italy participates with America, racing would have a fitting comeback on the Indianapolis course.

It is said the racing team which Indianapolis campaigned at other speedways will be reorganized. Another project now being discussed in the racing world is the formation of a Packard team. Other factory teams are expected. Plans are under way for a fitting reception of Eddie Rickenbacher when he returns from France, and nobody doubts but what Rick will be among those present when the 1919 season starts.

As for Chicago, there is little prospect of

any immediate race events as a result of the arrangement which led to the dismantling of the speedway here and the starting of an Army hospital on the grounds. It is unlikely that another speedway could be constructed for next year.

PHILADELPHIA TRADE CELEBRATES

Philadelphia, Pa., Dec. 7—The Philadelphia motor car and accessory trade prosperity jubilee is on. That fact is proclaimed all up and down the row. The motor car industry is getting back to a peace basis and the Philadelphia trade is taking this means to show it to the public.

The jubilee has no central point, no hall, or armory where orchestras play and society parades. It extends to all the places of business of those in sympathy with the movement—motor truck specialists, tire men, dealers in all sorts of accessories and lighting systems related to the trade. The jubilee consists of a special, concerted bid to the public to look at the industry as a thoroughly revived one, to call and see it in readiness, to think motor cars and talk motor cars and examine them at leisure and consult with managers and salesmen over their needs and desires for the coming year.

FORDSON DISTRIBUTERS

(Concluded from page 11)

still it is understood that if they sell equipment at all, it will be only such as has received the approval of Mr. Ford. An implement committee was appointed to, consider the merits and claims of all operative equipment, both in the line of tillage tools and belt power machinery, and to recommend the adoption of such implements as meet the requirements. Final decision will rest with the officials of the factory after considering the recommendation of the committee.

Mr. Sorensen told the distributors that whenever, in their judgment, it appeared desirable to locate a tractor assembly plant in their territory to take it up with the factory and the recommendation would receive consideration and if approved by the company, such assembly plant would be located. In this connection, it was explained to the distributors that the plant now being built at Green Island, on the west bank of the Hudson river, near Troy, New York, will not be an assembly plant, but only for the manufacture of small parts. The plant will be run exclusively by water power and will devote itself to the production of parts which will be shipped to Dearborn for final assembly.

The visitors were entertained by Henry Ford & Son with a dinner at the Detroit Athletic Club, followed by a motion picture entertainment showing the activities of the Ford organizations, a dinner at the Hotel Statler and an evening at the theater.



AUTO JUBILEE WEEK

Sat., Dec. 7—Sat., Dec. 14

"If You Don't Run—You Go Backward"—

Said the Fairy to Alice in Wonderland. It's only a Fairy story—but what a world of truth!

The Automobile Industry didn't stand still throughout those four long years of war. It ran full speed ahead—learning by experience—taking lessons from the War Book. Motor cars and trucks—yes—and tires and accessories, too—will never be the same as before the War.

Manufacturers learned how to speed up production as they never dreamed possible. They learned more about materials—engines—fine work—saving gasoline—making everything count for efficiency. And the motoring public and truck users are profiting by it immeasurably.

Good roads—everywhere—will be one of the great blessings of the War.

What's all this got to do with Auto Jubilee Week?

Everything—That's why we're thankful—joyful. You can share in the joy by joining in

AUTO JUBILEE WEEK, DECEMBER 7—14

Philadelphia Automobile Trade Association
On behalf of the Dealers in Motor Cars, Motor Trucks, Tires and Accessories.

Once More We Invite You to See Tomorrow's Announcement on Jubilee Week.

Co-operative advertisement which heralded Jubilee week in Philadelphia. More than seventy dealers are in the movement

Road Convention Opens in Chicago

State Officials and Highway Industries Gather for Joint Meeting

CHICAGO, Dec. 10—Highway officials, boosters et al., are gathered here this week for the big highway meeting. They were to have met last week but postponed the event so those who were to attend the meeting here could take part in the reconstruction congress in Atlantic City. But they are getting together this week, and a busy program is outlined.

Tomorrow and Thursday the joint convention of the American Association of State Highway Officials and the Highway Industries Association will be held at the Congress hotel. Governor Frank O. Lowden is to deliver the address of welcome in the morning, and Logan W. Page, chairman of the United States Highways Council, will speak on "Highway Control by Federal Government Under War Conditions" and James I. Blakelee, fourth assistant postmaster general, on "The Development of Motor Parcel Post Routes."

Wednesday morning W. D. Uhler, president of the American Association, will preside, and Wednesday afternoon S. M. Williams, president of the Highway Industries, will preside. Another governor, Governor James M. Cox, of Ohio, will speak then on "Highways—a Neglected War-Time Necessity." E. J. Mehren, editor Engineering News-Record, will speak on a national highway policy and Roy D. Chapin, chairman of the National Highways Transport Committee, on highway transportation of the present and future.

Thursday A. R. Hirst of Wisconsin will consider the marking of trunk highway systems, and H. Eltinge Breed of New York, license fees. In the afternoon George M. Graham, chairman of the N. A. C. C. motor truck committee, and H. G. Shirley, secretary of the Highway Industries Association, are scheduled to speak. An open meeting of the Highway Industries will be held Friday morning.

REO EARNINGS SHOW DECREASE

Detroit, Dec. 6—Net earnings for the Reo Motor Car Co. amounted to \$1,541,638, or \$22.06, in the year ending Aug. 31. This is compared to \$1,797,925, or \$25.95 a share, the previous year. Total assets shows an increase of more than \$1,300,000, while the current assets show an increase of \$1,500,000.

STARTERS FOR LAUSON

New Holstein, Wis., Dec. 9—The John Janson Mfg. Co. has placed a contract with the Christensen Engineering Co., Milwaukee, Wis., for starters, and hereafter all Lawson tractors will be equipped with them.

The Lawson is the first farm tractor, as far as is known, to be regularly equipped and sold with other than an electric starter and the first in the three-four plow size to be equipped with a starting device of any kind, and the action of the company marks a new epoch in the farm tractor field.

The Christensen starter differs from other starting devices heretofore put on the market in utilizing the "carburetion principle" instead of electric or air systems.

BAY STATE IS PROSPEROUS

Boston, Mass., Dec. 7—Figures compiled by the Massachusetts highway commission for the first eleven months of this year relative to the motor registrations, etc., show that the industry in the Bay State weathered the war very well. Instead of a big falling off in the listing of vehicles there was a general gain. A year ago 147,301 passenger cars were registered. This year there were 160,486, or an increase of 13,176. Trucks did even better. In 1917 26,964 were tabulated, and this year 33,011, a gain of 6,074, which amounted to nearly 25 per cent.

That the war did not keep men from entering the motor field is shown by the gain in dealers. A year ago 2379 were listed, and this year there were 114 more, bringing the total up to 2493. The only decreases were in the number of examinations of chauffeurs, due to lack of examiners, and also in the number of licenses issued to drive cars. The state will get \$2,184,408 from fees and when the fines are added this will mean a net revenue of about \$2,250,000, a gain of more than \$200,000 over last year.

PROSPEROUS YEAR IN KENTUCKY

Louisville, Ky., Dec. 6—The motor car in Kentucky experienced its most prosperous year in 1918, despite the war and the restriction on the production of passenger cars. The actual increase in registration was 18,454 for the year. There are now 65,870 motor vehicles in use in the Bluegrass state.

The dealers and distributors say that if

L. W. Page Dies

As MOTOR AGE goes to press to-day it is with the news of the sudden death of Logan Waller Page in this city, to which he had come to take part in the highway meetings of this week. Mr. Page died Monday night at his hotel of heart disease. J. E. Pennybacker, chief of management of the United bureau of public roads, of which Mr. Page was director, was with him at the time.

Mr. Page was to make a cross-country trip of road inspection after the meeting this week. He expected to meet with his ten assistant engineers of this district while here.

Logan Waller Page was a pioneer in highway work and was the inventor of machines used in highway improvement. In him road work loses one of its staunchest adherents.

they can obtain all the passenger cars and trucks they need from the factories, more motor vehicles will be sold in this state than ever before. All during the present year, distributors have been begging for cars, and while there have been factory driveaways on a scale never contemplated before, they have been unable to supply the demand.

The increase in registrations in 1918 was due to a great extent to the use of the motor vehicle by the farmer and merchant who showed a greater appreciation of the value of the car from a utilitarian standpoint than during previous years.

To give an idea of the growth in Kentucky, the passenger car and truck registrations by years since 1911 are given here-with:

1911....	2,868	1915....	19,500
1912....	5,147	1916....	31,700
1913....	7,210	1917....	47,416
1914....	11,746	1918....	65,870

At present there is one car for every thirty-five persons in Kentucky.

TRACTORS TO REMOVE SNOW

Harrisburg, Pa., Dec. 7—Tractors will be used this winter for snow removal in Pennsylvania. The State Council of National Defense will turn over several of the biggest farm tractors used in the fields last summer and fall to the state highway department.

GOODYEAR EARNINGS INCREASE

Akron, Ohio, Dec. 6—Net profits of the Goodyear Tire & Rubber Co. for the year ending Oct. 31 amounted to \$15,388,190.74, as compared with \$14,044,216.10 for the preceding year, subject to war tax. Gross sales for the year amounted to \$131,000,000, an increase of \$20,000,000. Approximately 15 per cent of the company's business for the year was with the Government. The net profits are equivalent to \$64.43 a share on the common, after deduction for preferred dividends, as compared with \$61.86 a share in the previous year.

TRACTOR RESTRICTIONS OFF

Chicago, Dec. 10—The American Tractor Association received a wire from Washington to-day advising them that all restrictions on the manufacture of tractors have been removed. Also, all requirements as to materials for tractors have been removed.

This will make it possible for tractor makers to go ahead with increased production plans for 1919 and will aid them in obtaining the materials necessary. It is particularly important from the standpoint of the maker with a new design, as under the restrictions it was impossible for him to get into quantity production.

CONTINENTAL BACK JAN. 10

Detroit, Dec. 6—The increased facilities which war work rendered necessary in the plant of the Continental Motors Corp. will be utilized for larger output of engines for both trucks and tractors. The company states that it already has many orders on its books and inasmuch as its war work has been largely of the same character as its regular production it will

be one of the first to get back onto normal production. The present orders for the Government will be completed in full by Jan. 10, and almost immediately thereafter normal production will be resumed.

The class B engine which the company has been building under contract with the Government will be kept as a regular model and offered especially for truck and tractor uses. The company has several large truck orders at the present time but has not done very much along tractor lines. An effort will be made, however, to secure future tractor business.

WISCONSIN DOUBLES CAPITAL

Milwaukee, Wis., Dec. 9.—The Wisconsin Motor Mfg. Co. has increased its capital stock from \$1,000,000 to \$2,000,000 to accommodate the growth of its business and to provide for future extensions of facilities and trade. Within the last year and a half the size of the plant has been nearly doubled.

LIPSNER RESIGNS FROM SERVICE

Washington, Dec. 7.—Capt. B. B. Lipsner has resigned as superintendent of the aerial mail service. Captain Lipsner objected to the assignment of "novices" in charge of important air work, and stated, "I wish to resign and keep spotless my record as first superintendent of the Aerial Mail Service."

VINCENT BACK WITH PACKARD

Detroit, Dec. 7.—Lieut.-Col. Jesse G. Vincent has returned to take charge of Packard engineering after an honorable discharge from the Army. He has been commended by the President for his services to the country, and with Lieut.-Col. George W. Mixer, found entirely innocent of improper or selfish intentions. Both officers were named by Charles E. Hughes in his report on the aircraft investigation as having violated a code. No action against either man has been taken by the Department of Justice, and the granting of full pardons to them was recommended to the President by Attorney General Gregory, who took up their cases in separate letters to the President.

The announcement from the White House states the two officers were guilty only of a technical breach of statute and worked entirely innocent of improper or selfish intentions.

FLYING ACROSS CONTINENT

Washington, Dec. 6.—Five army airplanes are on their way in a trancontinental flight, having left Rockwell field, San Diego, Cal., for El Paso, Tex. The flight is under the command of Maj. Albert D. Smith, now in charge of training at Rockwell field. His request that if his planes reach El Paso on time they be allowed to continue to the east and complete a trancontinental flight has been granted by Maj.-Gen. W. L. Kenly, Director of Military Aeronautics.

After leaving El Paso it is expected that the planes will stop at Kelly field, San Antonio, Tex.; Ellington field, Houston, Tex.; Camp Taylor, Montgomery, Ala.; Souther field, Americus, Ga.; Dorr field, Arcadia, Fla., completing the flight.

Highways Committee Reviews Year

Truck Convoy Work Considered Most Important Activity to Date

WASHINGTON, Dec. 6.—The Annual Report of the Council of National Defense, just issued, includes a review of the work of the Highways Transport Committee, the Automotive Products Section, the Commercial Economy Board and other divisions, some of which later in the year were made a part of the War Industries Board.

The most important work done by the Highways Transport Committee to date is:

Assisting the War Department in the operation of its motor-truck convoy service to save freight cars and give proper training to Army truck drivers, as well as to expedite the delivery of the trucks themselves.

Encouraging states in the snow zones to remove snow from the main highways and keep them open for highway traffic during the winter season.

Assisting the Railroad Administration to reduce terminal congestion by developing store-door delivery to relieve promptly terminals of freight as it is received.

Increasing highways transport resources and avoiding waste by eliminating empty running of vehicles. Return-load bureaus are established for this purpose.

Making more food available to the cities and saving farm labor for work on the farm by developing rural motor express routes from agricultural areas to consuming centers or shipping points.

Making highway transportation more efficient by encouraging the use of better methods of transportation and more effective vehicles, with resulting saving of man power and increased transport capacity.

Organizing the highways transport facilities of the country by the appointment of state highways transport committees under the state councils of defense with the duty of developing these policies in each state.

Plans Are National

Plans of national scope were formulated and activity on the many important duties ahead was begun immediately. Contracts were formed with the different Government departments, state councils of defense, organizations interested in this work, etc.

The Automotive Products Section, the report states, controlled during the year the allocation of Government business and purchases of the Government and the Allies of motorcycles, motorcycle sidecars, motor cars, motor trucks, motor truck bodies, motor truck tractors, motor truck trailers, armored cars, military tractors, military tanks, marine gas engines, automotive accessories and airplane parts.

The report tells in detail of the development of the class B truck, drawings of which were started in December, 1917, as a result of the co-operation between the Quartermaster Corps and the Society of Automotive Engineers.

The Automotive Products Section advised the Government and the Allies as to the allocation of more than \$400,000,000 worth of apparatus.

During the year two shortages occurred, one of magnetos for trucks, tractors and airplanes, due to shortage of platinum, and second, a shortage of wireless apparatus, due to lack of mica. Producers, importers, jobbers and users of this were called together and steps were taken to conserve the platinum, while at the same time domestic mica was discovered which was equivalent to any India mica for electrical apparatus.

On April 18, says the report, the Conservation Division arranged with the rubber industry for a reduction in the numbers, sizes and types of tires from 287 to 282 immediately and by gradual steps during the next year to nine sizes and types. This, adds the statement, will result in economy in production and make a large reduction in the quantity of inactive stocks in the hands of manufacturers and dealers.

OIL ENGINES CONSIDERED

Chicago, Dec. 6.—Two papers were presented at the meeting of the Mid-West section of the Society of Automotive Engineers here tonight. One was by W. G. Gernandt, vice-president and general manager of the Gernandt Motor Corp., this city, on "The High Compression Oil Engine," in which he considered the Otto, or constant-volume, engine, and the Diesel, or high-compression engine, with comparison of the various methods of injecting liquid fuel into the combustion chamber of an engine, namely, the Diesel, Hvid, McClin-tock and Gernandt methods.

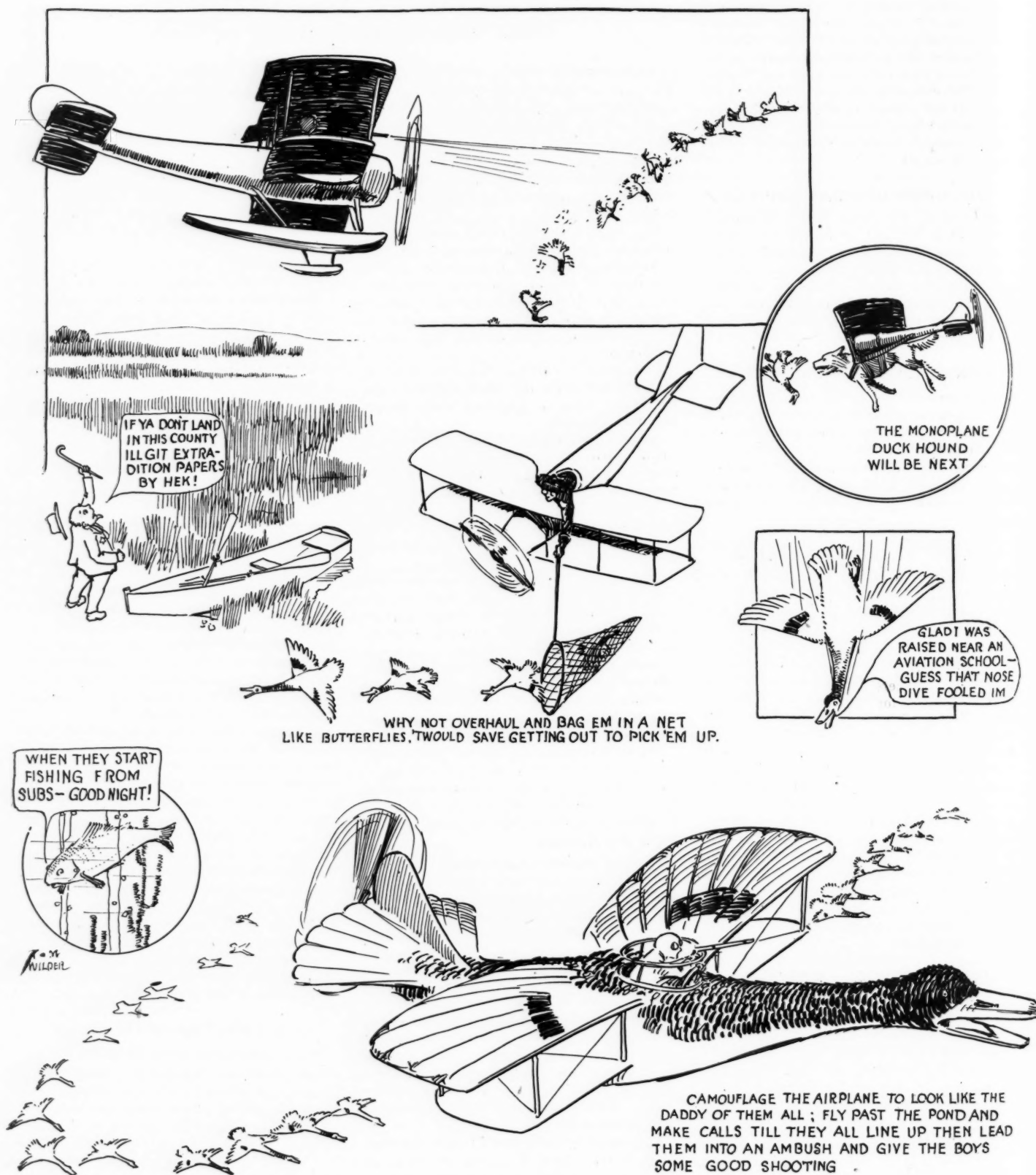
The main point to be brought out, however, said Mr. Gernandt, was that regardless of the method of fuel injection, advantage should be taken of the high economy and adaptability of burning the heavy fuel oils actually accomplished by the use of a high-compression oil engine.

Charles A. Reagan, district manager of the stores and scrap section of the Ordnance Department, read a paper on "Scrap Organization and Scrap Salvaging." In it he told how the Chicago district alone has reclaimed many hundreds of thousands of tons of metals, turning back, through their sale, considerable money into the United States Treasury.

U. S. TRACTOR IN URUGUAY

Washington, Dec. 6.—A trial exhibition of an American tractor at Montevideo, Uruguay, reported by the American consul there as taking place early in October, attracted considerable attention in interested circles. The exhibition consisted in plowing to a depth of 4.7 and 7 in. and at a velocity of from 2.5 to 3.1 m.p.h., harrowing and free running. It is estimated that the tractor can plow 10 acres in an 8-hr. day with a consumption of 5.8 gal. of kerosene per 2.471 acres. The make of tractor was not named in the report, which stated that it was offered for sale completely equipped in Uruguay for \$1,447.

A Peace-Time Use for Planes?



Duck shooting from airplanes is listed as the latest Minnesota sport. In fact, the state game and fish commissioner found it necessary to issue a ban against the aerial hunters. The commissioner admits the sport is getting to rival that of Texas, where airplanes fare forth to stalk the duck. Anyway, here are some ideas on the subject

Ohio Dealers Get Together

Endorse Continuation of Economy—Favor Road Increase—Something Doing Clear Through

AKRON, Ohio, Dec. 6—More than 500 tradesmen from Ohio attended the convention in this city yesterday and today of the Ohio Automobile Trade Association. At a dinner and entertainment last evening in the Armory 640 men were present.

For attendance and enthusiasm the meeting is about the biggest thing of the kind that has occurred in the trade.

The affair started with a snap and snapped all the way through to the closing hour this afternoon, at which time more than 100 new members joined the organization which a year ago was about as dead as an association could be and be credited with existing.

The management of the organization has done real work within the last year and took an opportune time for its annual and reconstruction meeting. The dealers and garagemen all displayed great interest at all the sessions and left town tonight with a resolve to start the automotive business going in Ohio with real vim.

Much Credit Due Officers

To President A. E. Mitzel, Canton, and Manager Victor Moon, Columbus, goes much of the credit for what has been done during the last year. In many Ohio cities are strong local associations, all working for better business and the general welfare of the trade. Both men were re-elected.

The new officers of the Ohio Automobile Trade Association are: President, A. E. Mitzel, Canton Motor Car Co., Canton, re-elected; first vice-president, Andrew Auble, Jr., Akron Auto Garage Co., Akron; second vice-president, Frank Girard, Columbus; manager, Victor Moon, Columbus; directors, Charles M. Cole, Ada; W. E. Moler, Moler Auto Sales Co., Athens; Frank Dudley, Norwalk.

At the final session this afternoon some resolutions of trade importance were passed to crystallize sentiments which are general with the whole trade.

One resolution refers to the elimination of unethical dealers. The Ohio trade proposes to appeal to the factories of such dealers as a final resort.

The association approved a resolution for the repeal of the Sherman anti-trust law, as antiquated. It voted to give returning soldiers their old jobs back. It endorsed the continuation of those economies which were applied as war measures, all of which have been of great benefit to business. And there was great enthusiasm when the vote was taken on a resolution favoring the establishment of a Federal department for the development of good roads.

The convention opened Thursday morning with an address of welcome by Mayor I. S. Myers of Akron and also by President A. O. Wood of the Summit County Automobile Dealers' Association. President Mitzel responded.

In the midst of the proceedings leather-lunged newsboys burst into the hall with a convention extra—and folks woke up. After lunch C. M. Hamel, secretary to H. S. Firestone, talked on reconstruction. George C. Hubbs, assistant general sales manager of Dodge Brothers, held the crowd still for 45 min. with frank statements as to dealer faults and remedies.

W. O. Rutherford, vice-president of the B. F. Goodrich Co., pointed out pertinent facts regarding organization, and Commissioner William M. Webster of the National Association of Automobile Accessory Jobbers aroused the enthusiasm of the convention by an address on the need for co-operation in the era now opening.

Thursday night at 6:30 dinner was served in the meeting room and for 3 hr. there was a whirl of eats, vaudeville, boxing bouts and just plain man enthusiasm.

This morning, Friday, B. M. Ruark of the Champion Spark Plug Co. laid down more fundamentals on reconstruction and the convention heard George M. Graham, of the Pierce-Arrow, chairman of the motor truck committee of the N. A. C. C., deliver an address that made every man sit still for an hour and cheer wildly at the close.

Mr. Graham talked on what has happened at Washington as regards the truck and car business. He told how the truck business will develop and how there are certain unfavorable factors, such as the trucks now in Government hands. But he said things should work out well and that

the dealers should profit greatly. He paid a tribute to Americanism and received the greatest applause of any of the speakers.

After lunch an evangelical session resulted in more than 100 new members, and the officers, selected by the nominating committee, were chosen by cheers instead of by ballots.

Thereafter the visitors were taken to the numerous big rubber factories.

For organization the convention sets an example for holders of such affairs. From the time a visitor struck town until he left he was cared for by a reception committee, which got his room—and rooms were scarce—got his tickets, took him to the Armory and made his stay very pleasant. The management of the whole affair was by Cecil Welker of the Akron Hardware & Supply Co.

Rubber Makers Aid Meeting

The big rubber companies gave their enthusiastic support to the project, contributing \$3,000 as a fund for the success of the convention.

The Ohio Automotive Equipment Jobbers' Association held a session Wednesday, the day before the big meeting. The following officers were elected: President, Howard M. Dine, Dine-DeWees Co., Canton; vice-president, J. C. Hipp, Pennsylvania Rubber & Supply Co., Cleveland; secretary, G. M. Bender, Union Supply Co., Toledo; treasurer, H. H. Brenner, I. J. Cooper Rubber Co., Cincinnati.

National Road Department Urged

Be it resolved: That the Ohio Automobile Trade Association recommends and urges the creation by Congress of a national road department with full authority to act in extending federal aid to the states and supervising improvement of highways that are of national importance; and

That the state laws be so strengthened as to permit of larger and more rapid development of the state aid system.

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War Economies Endorsed for Peace

Whereas, war necessities have brought to our attention the practice of economies, many of which have been of material benefit to dealers;

Be it resolved: That we, the Ohio Automobile Trade Association, endorse the present standardization of tires, as set forth by the Economy Board of the Council of National Defense;

That we endorse the continuation of progress of the economies adopted for war purposes, namely:

The elimination of unnecessary service,

The night and Sunday closing,

The cash basis,

The education of owners to the care of their own cars,

The establishment of schools for motor car mechanics,

The admitting of apprentices to repair shops.

Reconstruction Congress Stresses Need of Co-operation

ATLANTIC CITY, Dec. 6—The necessity of thorough organization of all trades for full co-operation during the reconstruction period and the immediate need of thorough study of the labor question of the industry are the two biggest items on the peace-time program of American business. These two items were reiterated by speaker after speaker before the 5000 members of the war service committees called together by the Chamber of Commerce of the United States, which has been in session this week.

Members of the war service committees of 387 war-mobilized industries, representing a capitalization in excess of \$20,000,000,000, and comprising the biggest men of American business, have spent the week in considering methods of re-adjusting the industrial affairs of a world turned topsy-turvy by war. The convention listened to speeches and advice from the leaders of thought of American business, and of Governmental departments.

Lesson of War Told

Lessons of the war and the close co-operation of individual units of each part of the industry of the United States, made necessary by war conditions and fostered by the Government as war service committees, were brought home with the result that each group of business men decided to continue this co-operation and organization throughout the reconstruction period and formally resolved as a convention of the whole to retain their organization. This will be evidenced through the period of re-establishment of normal conditions and afterwards by the greatly increased force and influence in the management of America's destiny on the part of business interests through the Chamber of Commerce of the United States.

Some of the leaders of thought whose message was given directly to the business men assembled were Harry A. Wheeler, president of the Chamber of Commerce of the United States; William C. Redfield, secretary of Commerce; Charles M. Schwab, director-general United States Emergency Fleet Corp.; John D. Rockefeller, Jr.; Henry P. Kendall, chairman committee on industrial relations of the United States Chamber of Commerce; Paul Warburg, former member of the Federal Reserve board; John N. Willys, president Willys-Overland; A. C. Bedford, chairman Standard Oil Co. of New Jersey; Van H. Manning, director Bureau of Mines; David Ludlum, president Autocar Co.; George N. Graham, Pierce-Arrow; Frank A. Sieberling, Goodyear Tire & Rubber Co., and others.

Motor car and truck dealers were represented at the convention by President F. W. A. Vesper of the National Automobile Dealers' Association. A. L. Reeves, manager of the National Automobile Chamber of Commerce, took part.

Broad advice to the business men of the

By Darwin S. Hatch

Managing Editor Motor Age

country was given in the general sessions on the Million-Dollar Pier. At the same time, smaller meetings were being held in all the hotels in which the more intimate difficulties and problems of reconstruction as related to each industry were discussed

at group meetings. Of the thirty-odd resolutions adopted to-day at the final general session, and which stated in a concrete way the outcome of the deliberations of the convention, the whole tenor was the appreciation of the need of co-operation.

The resolutions urged Governmental encouragement of pivotal industries; legislation which will permit reasonable co-opera-

Worth-While Ideas from Big Men of Business

THE period of reconstruction will be short or long, the operation gradual and easy, or difficult and costly, in the measure that American business will co-ordinate its forces, work in unity and not only wisely choose its representatives but support them in their search for facts and back them in their conclusions. —Harry A. Wheeler, president Chamber of Commerce of the United States.



CONCENTRATE thought, purpose and effort on output. Find and seize hold upon all science has said or can say concerning industry. It was largely because Germany made her industries the operating end of her sciences that her commerce grew so fast and powerful in the years before the great war. It was more German science than German wages that made her competition dangerous. The responsive power of well paid and contented labor to far-sighted leadership in industry is the greatest force in production and happy are they who have it behind them.—William C. Redfield, Secretary of Commerce.



ONE of the lessons this great war has taught us is true democracy. The thing we have to do is to teach, not patronize, to educate and have the American laborer know and feel that he can stand with his head in the air, as you can and as I can, and say with pride, "I am an American citizen." What does American citizenship mean except that any man to be a true American citizen must be able to hold up his head and feel within his heart that he has done his duty to his nation and to his fellow men. What prouder thing is it for any man to say than "I am an American citizen."—Charles M. Schwab, director general United States Emergency Fleet Corp.



THE war has accentuated and vastly accelerated the growth of Government responsibility and influence in business. This development is world-wide at this time, it is natural, logical and inevitable. While it will tend to elevate business, there is danger that unless carefully safeguarded in both form and scope, it may tend to corrupt and to debauch Government. It is this peril that we are facing at the moment of our proudest triumph, and it must be our serious concern that a national effort born in idealism should not bear the seeds of ultimate national decline. The reconstruction period places us face to face with this problem and it is during this period that thoughts will have to be developed leading to a solution entirely fair to the people.

The reconstruction period is pregnant with the seeds of good or evil; what it brings forth will depend upon the care and devotion that the country gives to its problems. It is a period, as its name indicates, for constructive thought, not for destructive criticism. If the flower of our manhood is willing to serve the country during reconstruction and peace as it did in times of war, and if the country's new and larger duties and its higher conceptions of them have taught it to want as its servants none but the truly best, then we may look into the future with hope and confidence that we may prove ourselves competent and faithful guardians of the sacred trust this glorious period has placed into our hands.—Paul M. Warburg, former member Federal Reserve Board.

tion between competing firms under appropriate Federal supervision; consideration of business interests in the new taxation, elimination of paper profit as a basis for taxation; return of railroads to private ownership under a federal charter; opposition to Government ownership and operation of telegraphs, telephones and cables; enlargement of the merchant marine and expansion of port facilities; study of public utilities to permit their legitimate growth; use of all necessary shipping for international reconstruction; European commission of the chamber of commerce to study reconstruction needs and be available for advice at the peace table; development of foreign trade; adoption by all industries of the uniform cost accounting system, and

the endorsement in letter and spirit of the principle of the industrial creed laid down by John D. Rockefeller, Jr.

This creed of Rockefeller's is a statement of principles of relation between capital and labor, and the endorsement of the national chamber of commerce lends significance to it, as indicating how serious a problem it is considered by American business men and the changing attitude of business men toward the labor question. In view of the fact that nearly every one of the important speakers referred to the question and all seemed to have the same spirit, with perhaps a change in details and direct application, it is worth while summing up Rockefeller's creed, which can be done in its first three articles, as follows:

1—Labor and capital are partners, not enemies. Their interests are common interests, not opposed, and neither can obtain the fullest measure of prosperity at the expense of the other but only in association with the other.

2—The purpose of industry is quite as much to advance social well being as material well being, but in the pursuit of that purpose, the interests of the community should be carefully considered and the well being of the employes as respects living and working conditions should be fairly guarded, management should be adequately recognized and capital should be justly compensated and failure in any of these particulars means loss to all.

3—Every man is entitled to an opportunity to earn a living, to fair wages, to reasonable hours of work and proper working conditions, to a decent home, to the opportunity to play, to learn, to worship and to love, as well as to toil, and their responsibility rests as heavily upon industry as upon government or society, to see that these conditions and opportunities prevail.

There was one resolution endorsed by nearly all the groups and of particular interest to the motor trade, which did not survive as a resolution of the United States Chamber of Commerce. This was the highways resolution, backed by the Highways Industries Association, which had the approbation of several important speakers at the general meeting, as well as coming out in the form of a definite resolution from the meetings of the related groups and major groups.

The economic importance of an uninterrupted policy with regard to national highways was separately advocated by Charles M. Schwab and Secretary Redfield. The resolution as adopted by the war service committee on highways urged the immediate creation of a separate and distinct Federal highways commission whose duties it shall be to construct and maintain a system of national highways and that appropriations be made therefore.

Dealers Have Wonderful Opportunity

"THERE is not even standing room for pessimists in American business today," said David S. Ludlum, president of the Autocar Co., in opening the meeting of the Automotive group. His statement was backed up by George M. Graham, president of the Pierce-Arrow Motor Car Co., who stated that business faces a period of unprecedented prosperity.

With the practical dislocation of foreign trade, Mr. Graham pointed out that dealers in the United States are given an unparalleled opportunity. Hand in hand with the opportunity of the dealer goes the prosperity of the maker and the contentment of labor. Upon the ability of the dealer to distribute the product depends the ability of the maker to keep his plant busy and thus to keep his workers fully employed.

With relation to cancellation of Government contracts Mr. Graham deplored the excessively rapid action of the Government and stated that there was little that could be done now to alleviate conditions which might not have come to pass had the Government heeded the suggestions which it sought from the industry, but which it subsequently discarded.

When the matter of contract cancella-

Worth-While Ideas from Big Men of Business

THE Conservation Division of the War Industries Board has worked closely with men in more than 200 trades and industries.

Whatever else the experience has shown, it has proved the ability of competitors to co-operate effectively and the willingness of the country to have them co-operate for the elimination of wasteful practices. It has shown that such co-operation is good for the country and good for business, too.

The conservation division was created as an emergency body, with more or less coercive power. There is no need of this kind of body, now that the emergency is past. But are there not peace-time possibilities from the experience?

We have had two not altogether satisfactory kinds of business in this country: the extreme of competition on one side and the extreme of combination on the other. The first is wasteful and the second open to well known abuses, which the laws have tried to prevent.

If, now, you get a kind of competition from which the waste has been eliminated by counsel and co-operation among the competitors, haven't you a more effective system than either of the extremes? This, I like to think, is what our war experience has been tending toward.—A. W. Shaw, chief of Conservation Division of War Industries Board.



ONE of the most useful lessons which the struggle has taught is the value of co-operation. The successful outcome of the conflict was made possible largely because of the co-operation of the many interested elements. Irrespective of race, creed or color, men have fought and died and worked and suffered side by side. The kinship of humanity has been understood as never before. Common danger, common toil, common suffering have developed the spirit of brotherhood as nothing else could. To-day we stand at the threshold of the period of reconstruction, and as we turn from the problems of war to the problems of peace we may look for such success in solving the latter as has been obtained in dealing with the former only as we are animated by the same spirit of co-operation and brotherhood. The hope of the future lies in the perpetuation of that spirit and its application to the great problems which confront us nationally as well as internationally.—John D. Rockefeller, Jr.



IT is of vital importance to our national welfare that we shall profit in time of peace by the lesson which we have learned in time of war.

It has taken a world war to prove the lesson home to us. The case has been proved; the demonstration made; it remains for us to make use of knowledge so dearly bought.

And we must not forget that this co-operation succeeded because it was founded on mutual confidence, was free of special privileges, secret understandings and unfair tactics. If we are to realize in full, for industry, the same benefits, the same fundamental principles must be observed. Nor can industry expect permission for such co-operative effort save under some wise and just form of government supervision.—Mark L. Requa, general director Oil Division, U. S. Fuel Administration.

tion first came up, the motor car industry was requested to consult with Government authorities and to offer such recommendations as in its opinion would operate to the best advantage of all concerned. Motor vehicle makers, in approaching this problem, made only one request of the Government. That was that the Government adjust cancellations with this one thought in mind: "In what period of time can manufacturers turn from a war basis to a peace basis without creating conditions of unwarranted unemployment?"

It is Mr. Graham's opinion that the motor car industry can and will readjust itself to a peace production basis without outside assistance. Despite disrupted manufacturing conditions and with sales organizations in many cases completely torn down, the sentiment still prevails in the industry that somehow the manufacturers will get out. In consequence, it is believed that the best policy will be to urge that the industry be left severely alone to solve its own problem.

"Motor car and motor truck dealers must by merchandizing and salesmanship replace the domestic business that has been taken by war business," added Mr. Graham.

Advance of Trucks

The motor truck business has made a greater advance in the last year than it has in any previous ten years. Never before have the possibilities of the motor truck for overland transportation, for the transport of food products and for short-haul freight work been so vividly placed before the business interests of the United States.

"It is our belief," said Mr. Graham, "that the trucks at present in use abroad will be held there. Trucks owned and operated by the Government of the United States, will, in all probability, continue to be so owned and operated.

"It is likely that many thousands of army vehicles will be used for a long time at the various cantonments; that hundreds will be turned over to the postal authorities for the use of the postoffice, and there is a possibility that the railroads may be induced to take up the use of motor trucks as a means to relieve the rail carriers of short-haul work."

He said that the motor car industry must have a fair chance under normal competitive conditions to work out its own conservation and that the industry should not be controlled except by itself.

The committee placed itself on record as favoring the most extensive development of highway improvement that can be obtained. A federal highways commission is urged with powers to maintain and construct a system of national highways which will facilitate and stimulate to the fullest possible extent the use of highway transportation.

John N. Willys, president of Willys-Overland, added to the optimism of the motor trade. In a paper before the general session of all the iron and steel industries, read by his secretary, Mr. Willys told of the problems of the motor car makers in resuming work on a peace basis and stated that they were already far along in the changes to be made. He pointed out the great possibilities for both domestic and

foreign fields, due particularly to the fact that the industry was better understood and appreciated than ever before. It is now a regularly recognized method of transportation in which cars are worn out and replaced in the same way as shoes and other commodities and just as necessary.

This is now true of thousands of families as well as in business and many who have refrained from buying new cars during the war are now getting into the market for them and asking for immediate delivery. Then, too, the used-car market has been practically depleted which leaves the field practically clear for the new cars. New

developments in cars will soon be making their appearance, he said, as experimental work was not entirely abandoned, and altogether he painted a rosy picture of the future of the motor car business.

"The demand for motor cars will be unprecedented at home and abroad," he said. "The effect of European competition, especially in export markets, will not be seriously felt until the countries in the war areas have rebuilt their industries, filled their own requirements and been able to manufacture a supply to sell to other countries.

"Motor cars have become such a vital

Public Works

"The development of public works of every sort, as recommended by the President should promptly be resumed, in order that opportunities of employment may be created for unskilled labor."

National Trade Association

"The experiences of the war have clearly demonstrated the value of national trade organizations and their service to the country as well as to industry."

"This conference heartily approves the plan of organizing each industry in the country in a representative national trade association and expresses the belief that every manufacturer, jobber and producer of raw materials should be a member of the national organization in his trade and cordially support it in its work."

Cancellation of War Contracts

"It is in the public interest that all war orders placed by any contracting agency of the Government and accepted in good faith, whether formally and regularly executed or not, should, upon cancellation by such contracting agency, be promptly and equitably adjusted and satisfied as if every formality had been observed, and when so adjusted the amount ascertained to be due by the Government should be promptly paid to the end that these funds may be utilized by the industries of the country to speed their transition from a war to a peace basis."

"If it should be ascertained that legislation is necessary or desirable to accomplish this end, Congress should forthwith enact such legislation."

"Officials dealing with questions of adjustment on account of war orders must necessarily be familiar with all the conditions affecting the order. It will greatly promote expedition and the interests of both the Government and private enterprise for the officials who made the contracts to remain in the Government service to participate in the readjustments."

Surplus Government Supplies

"Under date of Nov. 29, 1918, the Secretary of War issued a public statement, 'To prevent too violent dislocation of industry from the standpoint of both employee and employer, accumulation by the War Department of either raw material or finished product will be distributed when and where liquidation of such supplies will least interfere with the return of industry to normal condition.' Such action would seem to insure the stability of the industries affected which fully appreciate this liberal position."

"Therefore, the War Service Committee of American Industries hereby tenders to the War Department its services for its respective industries for the purpose of advising with and assisting the War Department in the disposition of such materials."

Removal of Restrictions of Industry

"It is in the public interest that all war regulations of industry should be revoked and all war restrictions on industry should be removed as speedily as practicable, save such industries as are engaged in the production, preparation or distribution of foods, feeds and fuel, and such last named group of industries should be freed from war regulations and restrictions as early as consistent with the welfare of this nation and of the Allies."

Relocation of Labor

"The conversion of the industry of the country from a peace basis to a war basis involved a general and important dislocation of labor. This movement was gradual. The end of the war involves a much more rapid change in industry; while there will be a great demand for labor to meet the foreign and domestic requirements there may be for a time in special places a temporary condition of unemployment."

"In the new relations of industry to labor we conceive it to be incumbent upon the community affected promptly to meet such conditions."

"The local chambers of commerce should be able to contribute in an important way in this work."

Trade Press

"This conference has been singularly aided, however, by its trade press of America in having its daily proceedings published in the special editions of a paper gotten out each morning for that purpose alone. For this splendid service and the spirit which inspired it, the conference now desires to express its appreciation and to extend its thanks."

part of the very fabric of life that their production is bound to be governed by practically the same laws as any other commodity. Cars will be used, worn out and replaced the same as shoes or clothing or anything else, entering so intimately into a man's life."

U. S. Oil Control Is Opposed

IMMEDIATE elimination of the various forms of government regulation imposed on the petroleum industry by the fuel administration at Washington as wartime emergency measures was urged by oil men of the National Petroleum War Service Committee, A. C. Bedford, chairman of the Board of Directors of the Standard Oil Co. of New Jersey, and chairman of the committee presiding. Their discussion on this subject drew the statement from Mark L. Requa, director of the oil division of that administration, that it was the purpose of Fuel Administrator Garfield to wind up the affairs of the fuel administration as soon as possible and the oil industry would be

allowed to control itself even though it was still subject so governmental regulation under the Lever bill.

"If the removal of restrictions bring about conditions within the industry which work toward higher prices, then the industry must remember that the Fuel Administration will be forced to bring its authority to bear again to check such rising prices," stated Oil Director Requa.

The general sentiment of members of the oil industry present was that conditions within the industry were such as to present little likelihood of bringing rising prices in the near future. Some of the speakers during the day voiced the opinion that the contest is nearer at hand than is generally believed to determine whether industry in this country shall come more and more under Governmental regulation and authority or whether it shall regain its own initiative to a greater degree. It was urged that more than any other business the petroleum industry needs entire freedom to direct its own affairs if the needs of the coming year—which will be largely an oil age—are to be met.

Oil Industry Opposes Federal Road-Building and Favors Local

THE oil industry went on record as against Federal road-building but favoring the construction and maintenance of highways under local supervision and by local and state taxation. This was something of a surprise, as most of the other 300 industries officially represented at Atlantic City have or will urge a strong Federal road-building program under a special cabinet officer.

The action was taken in the form of a resolution adopted by the group meeting of the oil and oil products group under the chairmanship of A. C. Bedford, chairman of the Standard Oil Co. of New Jersey. The resolution opposed the building of highways by the Federal government until the constitution is changed giving more power to the highways commission and urges that for the present highways be built and the roads to be improved be selected by the localities involved.

Other resolutions urged the National Petroleum War Service Committee to form a national association of the petroleum industry and indorsed the attitude of the American government in protesting against any confiscation of American property in Mexico.

The surprising highway resolution followed a talk by Van H. Manning of the Bureau of Mines, who in telling of the possibilities of fuel conservation in the future and in pointing out ways in which the oil industry could improve its methods stated that from 50 to 75 per cent of all the oil in the ground fails to reach the surface, being lost in the sands, etc. Another field of research which was pointed out as looking to a more complete use of the crude supplies is in the improvement in cracking oils to get their lighter constituents.

Mr. Manning also pointed out the need of developing the enormous reserves of oil in the oil shales but warned that such work was not one which could be engaged in

without large capital or with the expectation of immediate dividends.

For years, he said, the United States has supplied two-thirds of the world's supply of petroleum. If transportation and other facilities were as good in other countries, among them, Mexico, South America and India, the world's output could be greatly increased. The American oil industry, he urged, must play a part in developing these foreign fields. He told the oil men that their industry had nothing to conceal and urged them to take the public into their confidence.

He complimented the oil industry for its part in the winning of the war and stated his pride in the American citizen for the way in which the public responded to the gasless Sunday request and other conservation measures.

MICHIGAN TO PUSH ROADS

Lansing, Mich., Dec. 6—Michigan is on the threshold of a road-building era never before equalled in the state, according to Frank F. Rogers, state highway commissioner. During 1919 there will be constructed within the state between 1500 and 2000 miles of highways, at an estimated cost of \$8,000,000 to \$10,000,000.

The 1919 program will at least double that of 1918, when the total mileage built dropped to 793. The best previous year showed 1053 miles constructed. In the five months ended Nov. 30 the state highway department paid out \$1,080,984 in state rewards on roads, more than double the amount for the same period in 1917, when the total reached \$560,184. The increase is due to a change in laws which allowed for greater reward on trunk line highways where concrete and similar forms of permanent roads were built. The highway department also stimulated the building of these types, because of their permanence

and this helped to swell the total rewards.

There has been a decided pick-up in applications for new roads ever since July 1. This will be accentuated in 1919, provisions having already been made for an allowance of almost \$2,500,000 for rewards next year. In the last four months, that is, the period ending Nov. 30, 435 miles of roads were completed and accepted by the state highway department, as against 320 miles in the same period.

REMOVAL OF SNOW

Washington, Dec. 6—The Highways Transport Committee in forming a definite program for snow removal this winter from the various highways has addressed the various State Council of Defense Transport Committees asking them to give immediate attention to the following subjects:

Of the powers of the state highway department or commission for removing snow. If such powers are not specifically covered by statutes, can maintenance funds be used in an emergency?

What co-operation and work can and will be undertaken by the counties and states?

What co-operation and work can and will be undertaken by the municipalities and state?

What preliminary measures can be undertaken which will prevent the drifting of snow, such as location and erection of snow fences? Also, the change of rail, board, picket and hedge fences which check the currents of air during a snowstorm, thus causing drifts to form, and removal of brush or weeds paralleling the road, which invariably causes drifts to form.

Attention by state highways department or commission, through its field organization and in co-operation with the state highways transport committee, of physical conditions along the highways tending to cause drifts. Recommendations as to the best means of dealing with same by preventive methods.

The Highways Transport Committee realizes that there will be great need for continuous motor truck movement this winter to assist in the distribution of foodstuffs from farm to mill and mill to seaboard or farms to seaboard, and consequently has asked the regional, state, district and county organizations to leave no stone unturned in facilitating this work.

JAY PATENT HELD INFRINGED

Chicago, Dec. 10—The Webb Jay patents on the Stewart vacuum system of the Stewart-Warner Speedometer Corp. were held infringed by the Sparton vacuum system made by the Sparks-Withington Company in a decision handed down by Judge Westenhaver of the United States district court here.

The Jay patent, No. 1132273, dated March 16, 1915, was held infringed on two out of fourteen or fifteen claims of Stewart-Warner. The other claims for which an infringement decision was asked were upheld in a decision that the Sparton tank did not infringe. Injunction and accounting of damages and profits against Sparks-Withington Company were granted. It is expected Sparks-Withington will carry this to the court of appeals.



How symptoms of tractoritis may be recognized

TRACTORITIS—the word was coined by M. H. Markey, automotive dealer at Lewisburg, Ohio—isn't a complaint nor a disease; it's rather a state of mind. It's peculiar to farmers, and, according to Mr. Markey, a lot of farmers have it and don't know it until the symptoms are pointed out to them. Mr. Markey himself has become an expert diagnostician. He can see and recognize the symptoms of tractoritis a mile away. When the farmer comes anywhere near him and the symptoms are well developed Mr. Markey takes him in hand for treatment.

Goes After Patients

Already he has discovered a lot of cases in his neighborhood. Some of them he has treated successfully. Some sixty-two of them, to be exact. And many others are undergoing preliminary treatment now. Mr. Markey estimates there may be as many as 100 or more who will develop a hard case during the next year, and he hopes to treat all as successfully as he has the cases he has had charge of in the past. The treatment is very simple and is invariably successful—he merely sells them a tractor.

You see, it's nothing but this. When the farmer gets into a state of mind where he feels that he must motorize, he begins to manifest the symptoms which are characteristic of tractoritis. Then, also, he becomes a fit subject for the ministrations of Dealer Markey, who proceeds to administer the only treatment which has been discovered up to this time to fit the case. Once the farmer becomes the proud possessor of a tractor the symptoms usually disappear, and a state of great mental contentment ensues.

But Mr. Markey displays unusual skill in discovering cases even where the symptoms are not well developed and where the patient never suspects that anything ails him. Some of Mr. Markey's competitors go so far as to say that Mr. Markey actually inoculates some of his farmer patients and induces the symptoms he subsequently subdues. Well, maybe he does. His competitors may call it inoculation or something else which is not nearly as complimentary, but in actual practice it is nothing more on Mr. Markey's part than

getting right out and digging up trade. That's the brass tacks way to talk about it, anyway.

How does he do it? Easily enough. It's so easy that any other dealer could do the same thing, too, if he tried. Mr. Markey goes out and convinces the farmer that a man of his social and financial standing in the community can't go on consistently and maintain his position in society unless he does own and operate a tractor. One might possibly think from this that all the farmers in Markey's neighborhood are leading citizens and plutocrats. As a matter of fact, Markey lives in a very ordinary neighborhood and one in which the majority of the farmers generally would not be considered as likely prospects for a tractor, for many of the farms run less than 100 acres in size and many of them are worked by renters. Looks unpromising, doesn't it? Mr. Markey doesn't think so, though.

In the first place, Mr. Markey selected a tractor well adapted in capacity and type to the conditions prevalent in his locality. He chose the Moline-Universal, which is a two-bottom tractor with the ability to cultivate row crops. It happens that a good deal of tobacco is grown in that portion of Ohio, and there is so much hand work about the tobacco crop, anyway, that when it is possible to do any part of it mechanically the innovation is welcomed. Well, the Moline-Universal has made good in the cultivation of tobacco.

Having gone thus far, Mr. Markey began looking around for well-developed cases of tractoritis. He began calling on his farmer friends and suggesting that they take the only known remedy for what ailed them. At first most of them came back with the protest that they were too poor, couldn't afford it.

"Too poor! Can't afford it! Forget

it! Forget it," said Mr. Markey. "Why, you've got so much kale that it's hanging in your whiskers, only you don't know it."

"Yes, I have," scoffed the farmer, "don't you know I'm a renter and that all I've got to show is a little hope and a bunch of kids?"

"Well, what do you know about that!" said Mr. Markey. "Here's a guy that's got all kinds of dough and he doesn't know it. Guess I'll have to show him. Here, you pauper, let's go over the stuff you've got cluttering up this farm and see what it's worth. You've got enough around you to buy two tractors."

So Mr. Markey and the farmer would go at taking an inventory of the farm equipment. He says he rarely finds a renter even whose investment does not total up to within the neighborhood of \$4,000 to \$5,000. He says most of them are amazed to discover that they really are well off, comparatively speaking, and never suspected it before.

Upholds Dignity of Farming

Well, once that inventory is made, Mr. Markey commences. He holds up the dignity of agriculture and says it is the duty of every good and financially responsible farmer to do all that he can to maintain it. He points out the advantages of power farming and shows the farmer how, by using the tractor for his cultivating, he can dispose of all his horses except one team. He talks about the cost of animal power and the maintenance of horses. He contrasts the economy of mechanical power and its low cost of maintenance. He gets under Mr. Farmer's hide, and before anybody knows it those incipient symptoms of tractoritis are inflamed into a veritable fever for motorization, which nothing but the purchase of a tractor will subdue.



The machine sold by this specialist in tractoritis has made good in the cultivation of tobacco

There's this much ground for the claim of his competitors that he inoculates his customers. He sure does. He creates a desire. Then he satisfies it. That's good business.

Mr. Markey shines on service, too. He keeps a tractor service man to whom he pays \$20 a week. He maintains two closed service cars. He is now planning to add a 2-ton service truck. This winter he will hold a tractor school for the benefit of his customers, old and new, actual and potential.

Tractor School Value

Speaking of a tractor school, Mr. Markey said if he had tumbled to its value earlier in the game he would have saved himself a lot of grief and expense and his customers a lot of trouble and wasted time. He's going to remedy that mistake this winter. He says the farmer will judge his tractor by the quality of work it will do, both in plowing and on belt work. For this reason he is teaching his customers not only to operate their tractors but the equipment which will be used with them as well. They're going to have their plows properly adjusted and their pulley ratios correct if Mr. Markey knows anything about the business, and he thinks he does. Every tractor Mr. Markey puts out he intends to have work to the best advantage of the man who buys it.

Mr. Markey does one thing which perhaps will not receive universal approval. He sells tractors on time. He does this because it is an accommodation to his trade

and because so many of his customers are renters. The terms always are short, however, within the limit required for rediscounting through the Federal reserve banks. This makes the business practically cash, as far as Mr. Markey is concerned, provided he does not make a serious mistake in granting credit.

Mr. Markey gives a reasonable amount of free service, limited usually to the delivery, starting the tractor and instructing the customer in its operation. He estimates his free service costs him about \$25 on every tractor sold, but this includes the unloading, delivery and the gas and oil given the customer at the time of delivery. In this connection he intends to use the 2-ton truck, when he gets it, for delivery; he says it takes too much time to deliver tractors in the country under their own power and besides the shaking up they get on the rough roads doesn't do them any good.

Mr. Markey, too, is not one of the loud kickers for more commission. He says that volume sales have solved the commission problem for him.

Next year, he says, there will be a big demand for belt power equipment to go with the tractors he already has sold and those he intends to sell. He is getting ready for that now. He says, too, judging from his own experience, that there are well defined cases of tractoritis in the territory of practically every dealer which the dealer can recognize and treat if only he will go about it in the right way.

tenanced. Otherwise there will be great hesitation and curtailed production with consequent unemployment.

FIFTH—Organize a national movement to encourage public works by state, municipal and county authorization to provide an important outlet for allocated labor and materials.

SIXTH—Solicit the advice and co-operation of competent bankers in the development of plans for international trade. The first necessity is to produce goods which our foreign customers want, but a more important question relates to foreign payments.

Question of Exchange

It is not a question of solvency or time payments but one of exchange. Foreign nations will before long owe us about \$10,000,000,000. The interest charge will be \$400,000,000 annually. The foreigners will not give up their scant supply of gold. With large trade balances in our favor and restricted shipments of gold for settling balances, our trade will be restricted by exchange premiums charged on drafts. We have paid 2 per cent on Canadian drafts and 5 per cent on Buenos Aires. Madrid, Spain, has paid 50 per cent on New York and Italy has paid 100 per cent.

SEVENTH—A ministry of education to extend to millions of children in the more isolated sections of the United States the same educational advantages enjoyed by the children in the large centers of population. Few persons realize that vast numbers of American boys and girls are being turned loose upon the labor market after the briefest kind of schooling under the direction of teachers with nothing more than an eighth grade education.

EIGHTH—The war has proved that we can, through intense co-operation, produce more goods with less men on the farms and in the factories than we produced before the war and greater production can be attained by encouraging men by profit-sharing to produce more and earn more. Greater production through greater economy and greater efficiency will be the solution of the problem.

NINTH—The task of the social and religious organizations of America is to so broaden the scope of service at home as to provide means of expression for those millions of young men who have learned the great joy of giving even their lives to help others. The Chicago society woman who confessed that before she entered war work she thought all persons outside her own set ate peas with a knife will be ready to help. The millionaire who made a life-long friend of the hod carrier and who proved himself a hero in the trenches will return a different man.

To Everyone a Chance

TENTH—Henceforth every young man must have "a chance for his white alley." No czar, kaiser or bolshevik will be tolerated in any industry. The true aristocracy is one of character, brains and capacity. The boy who inherits money or takes it by cleverness from others will have much to explain. He who creates new wealth by hard work will lead his fellowmen.

Ten Fundamentals for Reconstruction

By Edward S. Jordan

From address to show managers at the Cleveland meeting

THE future of every industry, including our own is at stake, and if unselfish co-operation can win a world war it can safeguard a nation in peace. A ministry of reconstruction should be organized immediately under strong and experienced leadership to encourage the unselfish co-operation of all national, state and local interests, industrial, social, political and religious in the execution of the following program:

FIRST—The regulation of demobilization to prevent unemployment and allocate materials, capital and labor. Give all war workers, as well as soldiers, thirty days' pay and transportation to their homes, which in many cases are far from their present employment. Idle men in crowds in big cities present the greatest danger.

Urges Highway Work

SECOND—Start immediately a program of national highway construction with standard specifications, using the present military camp equipment trucks and supplies. Pay a standard wage for various classes of work with a bonus to all workers for speed and efficiency.

THIRD—Extend the farm credit system within reasonable limits and encourage the production of farm tractors, not with the idea of making them cheap but more efficient. Thirty-seven per cent of the farm-

ers of America are tenants. Without national aid in acquiring property we will soon be dependent upon a peasantry.

FOURTH—Secure the co-operation of all intelligent business men in the observance of the following facts.

Prices should decline simultaneously with wages, materials and overhead. Price cutting for selfish or sentimental reasons while wages, materials and overheads are still high will react to the detriment of the man who starts it and the industry of which he is a part.

If a price has been inflated and is suddenly reduced to gain a competitive advantage, sales are more likely to be retarded than helped because the public will be inclined to expect further reductions before spring. There is no bottom to promiscuous price cutting. Furthermore, we are all in the same craft going through the rapids, and woe unto the man who rocks the boat. Only a mere weak competitor may go overboard, but the public will conclude that the whole ship is sailing on a dangerous course.

The buyer of steel, copper, cotton, wheat, or any general commodity should be made to feel confident that he is buying at the best price that will be possible for a definite period of time and that preferential prices to favored individuals are not coun-

U. S. Airplane Production

The Official History of Air Progress

By Lieut. H. H. Emmons

Chief of Engine Production Department

In Two Parts—Part II

MUCH agitation has centered about the assertion that thousands of changes were made in the Liberty engine. This is entirely incorrect and unfounded. The changes arranged themselves in three groups:

Design.

Increase of power.

Manufacturing limits.

As to design—There have been but two changes in design in this engine since it was first laid out in May, 1917. One of these was to change the oil system from the so-called scupper feed to forced feed. Either system worked properly on the engine, but the latter system is fool-proof while the former is not. We therefore substituted the latter system. The other design change was an alteration in one part of the connecting rod to allow the rod to have sufficient play without cracking.

The changes due to increasing the horsepower twice are covered by the foregoing subdivision. These were the results solely of the demands of our aviation authorities that the power be increased.

In manufacturing—As the engine was used in service and as the manufacturing progressed, it became evident that some of these limits should be changed and this action has been followed. This is the common practice in all manufacturing establishments. It has always been so on automobile motors and will always be so on any manufactured product. As new manufacturing processes are developed and as experience is gained manufacturing changes are always expected and are always made.

Agitation Was Unfounded

Therefore the agitation about changes in the engine, when examined and understood, is unfounded.

The writer procured an order from the head of the equipment division looking up the development of this engine in the Detroit district in charge of Major Heaslet, formerly vice-president of the Studebaker Corp., Major Hall and a committee of manufacturers composed of H. M. Leland of the Lincoln Motors Co., C. Harold Wills of the Ford Motor Co., and Bell and Roberts of the Packard Motor Car Co.

No abler men on engines and motors exist in the industry, and it was clear that by devoting their entire time solely to this engine and by avoiding interferences with their efforts, we were adopting the very best possible method of securing quick and reliable results. Resulting production, which will be detailed hereinafter, demonstrates that this course of action was the proper one to be followed.

The same method of concentrating authority was applied to other engines, including Hispano-Suiza, 150 hp.; Hispano-Suiza, 180 hp.; Hispano-Suiza, 300 hp.; LeRhône, 80 hp.

During July, 1917, the Signal Corps had purchased a miscellaneous assortment of small engines which could be secured in this country, none of which proved of any substantial benefit.

Real production began in August, 1917. The following table shows the total production of engines by months from that date to the present time:

1917	
July	66
August	139
September	190
October	276
November	638
December	595

1918	
January	705
February	1,004
March	1,686
April	2,214
May	2,517
June	2,604
July	3,151
August	3,625
September	3,801
October	5,297
November	3,305

Total 31,813

The production of engines as to types is as follows:

OX-5	8,412
Hispano-Suiza	4,101
LeRhône	1,178
Lawrence	451
Gnome	280
A-7-A	2,250
Bugatti	11
Liberty	15,131

Total 31,814

The total amount of horsepower produced up to Nov. 22, 1918, is as follows:

OX-5	757,080
A-7-A	225,000
LeRhône	94,240
Hispano-Suiza 150	532,350
Hispano-Suiza 180	97,920
Hispano-Suiza 300	2,400
Liberty	6,052,400
Bugatti	4,400
Lawrence	10,824
Gnome	30,800

Total 7,807,414

The results achieved by the Liberty engine were so satisfactory to the Allies that commencing June, 1918, they were very insistent in placing with us large orders for engines. It soon became apparent that we would need additional sources of engine supply over and above the 22,500 which was originally planned for our own Army and Navy. We therefore increased the

AIRPLANES MANUFACTURED AND SHIPPED

	To A.E.F.	At Fields	To Navy	Total
Training Planes	0	8,170	140	8,310
Service Planes	3,103	717	155	3,975
Total	3,103	8,887	295	12,285

AIRPLANE ENGINES MANUFACTURED AND SHIPPED

	At Plants	To A. E. F.	To Navy	To Allies	At Fields	Total
Training Engines	9,110	325	515	1	6,169	16,120
Combat Engines	5,245	4,981	3,746	1,090	632	15,694
Total	14,355	5,306	4,261	1,091	6,801	31,814

number of manufacturers by adding the three plants of the Willys-Overland Co. at Elmira, Elyria and Toledo, and also the Olds Motor Co. at Lansing, Mich., to the list of Liberty producers. We also placed orders for 8000 eight-cylinder Liberty engines with Willys-Overland and the Buick Motor Co. at Flint, Mich. When this was completed we had placed orders for engines as follows:

OX-5	9,450
A-7-A	2,250
Gnome	342
LeRhône	3,900
Lawrence	451
Hispano-Suiza 150	4,000
Hispano-Suiza 180	4,500
Hispano-Suiza 300	10,000
Bugatti	2,000
Liberty twelve	51,100
Liberty eight	8,000

Total 95,993

Our production of engines of all types during October was 5603, of which 3878 were Liberty twelve-cylinder. Under the above increased contracts we would have produced during January, 1919, 8000 engines per month which would have increased during the succeeding four months to a production of 10,000 engines per month.

The best known engine which is comparable to the Liberty is the Rolls-Royce which is the most prominent English engine. Our advice last summer from the English authorities was that the largest weekly production of Rolls-Royce engines had been fifty-nine and that the average weekly production was forty-five engines. It will be noted that during the month of October we were producing over 150 Liberty twelve-cylinder engines per working day.

Rolls-Royce Less Powerful

The Rolls-Royce engine develops approximately 100 hp. less than the Liberty and weighs approximately 100 hp. more than the Liberty.

During the month of October we produced of all types of engines a total of 5603. This is more than the total production of France and England during one month during the four years of the war.

By following the foregoing methods of production, we have achieved the following results:

1—Designed, developed and put into production during one year a 400-hp. type of perfectly satisfactory performance.

2—Designed, developed and produced within eighteen months over 15,000 of these engines.

3—Produced during eighteen months engines of all types totalling 31,814.

(Concluded on page 29)

Lamp Voltages for 1917 and 1916 Cars

Motor Age Maintenance Data Sheet No. 16

One of a series of weekly pages of information valuable to service man and dealer—Save this page

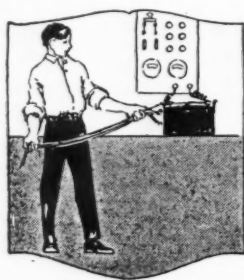
1917 Cars—Concluded

Car and Model	Base contact	Headlights			Sidelights			Taillights			Dashlights		
		Volts	CP.	Amp.	Volts	CP.	Amp.	Volts	CP.	Amp.	Volts	CP.	Amp.
Overland—85	Double	6-7	16	—	—	—	—	3†	2	—	3†	2	—
Packard—All	Double	7	24	—	7	4	—	7	2	—	7	4	—
Paige—All	Single	6-8	18	—	6-8	4	.75	6-8	2	.4	6-8	2	.4
Paterson—6-45	Single	6-8	12	1.5	6-8	4	1¼	3½-4	2	.84	3-3½*	2	.84
Peerless—56	Single	6-5	15	—	7	4	—	7	2	—	7	2	—
Pierce-Arrow—All	Single	6-8	21	3.5	6-8	4	.84	6-8	4	.84	6-8	4	.84
Pilot	—	—	—	—	—	—	—	—	—	—	—	—	—
Premier—6-B	Single	6-8	21	—	6-8	4	—	6-8	2	—	6-8	2	—
Reo—All	Double	6-8	15	3	—	—	—	3-4	2	1	3-4	2	1
Revere—A	Double	6	20	—	6	10	—	6	8	—	6	10	—
Seneca—A	Single	8	15	2.5	—	—	—	8	2	.42	8*	2	.42
Standard—E	Single	6	18	3	6	4	.84	3½	2	.84	3½*	2	.84
Standard—F	Single	6	18	3	6	4	.84	6	2	.42	6	2	.42
Stearns-Knight—All	Single	12	18	1¼	12	4	.42	12	2	.26	12	2	.26
Stephens—60 & 65	Single	6-8	15	2.5	6-8†	4	.84	6-8	2	.42	6-8*	2	.42
Studebaker	Single	7	12	—	—	—	—	7	2	—	7	2	—
Stutz—R	Double	6-8	18	8	6-8	21	2.5	6-8	2	.42	6-8	2	.42
Tulsa	Double	6-8	21	3.5	—	—	—	8-6*	2	.26	6-8*	2	.42
Velie—All	Single	6	15	2.5	1	4	.84	3-4	2	.84	3-4	2	.84
Westcott—S-17	Single	6	15	—	6	4	—	3	2	—	3	2	—
Willys-Knight—88-4	Single	6	16	—	—	—	—	3†	2	—	3†	2	—
White—All	Double	12-16	21	2	12-16	4	.5	12-16	2	.25	12-16	4	.5
Winton—All	Single	6-8	15	2.5	—	—	—	6-8	2	.42	6-8	2	.42

1916 Passenger Cars

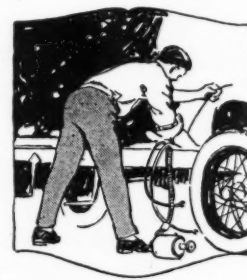
Abbott-Detroit	Single	6-8	15	—	6-8	2†	—	6-8	2	—	6-8	2	—
Allen	Single	6-8	15	—	6-8	4	—	6-8	2	—	6-8	2	—
Alter Eight	Single	6-8	18	—	—	—	—	6-8	2	—	—	—	—
Alter Four	Single	12-16	18	—	—	—	—	12-16	2	—	—	—	—
Apperson—All	Double	6	18	2.3	—	—	—	6	2	.7	6	2	.7
Auburn	Single	6-8	15	—	6-8	4†	—	6-8	2	—	6-8	2	—
Austin	Single	6-8	21	—	6-8	†	—	6-8	2	—	6-8	2	—
Brewster	Single	12-16	30-40	—	12-16	6†	—	6-8	4	—	6-8	4	—
Briscoe—All	Double	6	21	—	—	—	—	6	2	—	6	2	—
Buick	Single	6-8	16	—	6-8	4†	—	6-8	2	—	6-8	2	—
Cadillac—53	Single	7	18	—	8	6	—	4	2	—	4	2	—
Case—T	Single	6-8	18	2½	6-8	4	.84	6-8	2	.42	6-8	2	.42
Chalmers—32-B and 35-A	Single	6-8	15	—	6-8	4	—	6-8	2	—	6-8	2	—
Chalmers—26-C	Double	21	21	—	21	4	—	21	2	—	6-8	2	—
Chandler	Single	6-8	16	—	6-8	4	—	6-8	2	—	6-8	2	—
Chevrolet—H-2 and H-4	Single	6-8	18	—	—	—	—	6-8	2	—	6	4	—
Chevrolet—490	Double	6-8	16	—	—	—	—	6-8†	4	—	—	—	—
Cole—860	Single	6-8	21	—	—	—	—	3½	2	—	3½	2	—
Corbitt	Double	6-8	16	—	6-8	6	—	6-8	4	—	6-8	—	—
Crow-Elkhart—All	Double	6	20	—	—	—	—	6	2	—	6	2	—
Cunningham	Single	6-8	—	—	6-8	—	—	6-8	—	—	6-8	—	—
Daniels	Single	6-8	21	—	6-8	4†	5	6-8	2	5	6-8	2	5
Davis—All	Single	6-8	18	—	—	—	—	6-8	2	—	6-8	2	—
Detroit	Single	6-8	18	—	—	—	—	6-8	12	—	6-8	12	—
Dispatch	Double	12-16	24	—	—	—	—	6-8	4	—	6-8	4	—
Dixie—L	Double	6	15	3	—	—	—	3½	2	.84	3½	2	.84
Dodge—All	Double and Single	12	16	1	—	—	—	12	2	.26	12	2	.26
Dorris—I-B-6	Single	6-7	15	2.5	6-7	4	.84	6-7	2	.42	6-7	2	.42
Dort—5-A	Single	6-8	16	2.5	—	—	—	6-8	2	.5	—	—	—
Drummond	Single	6-8	21	—	—	4†	—	6-8	2	—	6-8	2	—
Empire	Single	6-8	15	—	6-8	4†	—	3-4	2	—	3-4	2	—
Enger	Single	6-8	15	—	—	—	—	6-8	2	—	6-8	2	—
Farmack	Single	6-8	18	—	6-8	6†	10	6-8	4	5	6-8	4	5
Fiat	Single	6-8	15	—	—	—	—	6-8	4	—	6-8	4	—
Ford—T	Double	6-8	15	—	Oil	—	—	Oil	—	—	—	—	—
Franklin—All	Double	14	21	—	14	4	—	7	2	—	7	2	—
F. R. P.	—	12-16	25	—	12-16	6	—	12-16	6	—	12-16	4	—
Glide	Single	6-8	15	—	6-8	4†	—	6-8	2	—	6-8*	2	—
Grant—V	Single	6	15	—	—	—	—	6	2	—	6	2	—

* Double contact. † Single contact. ‡ Dimmer.



Electrical Equipment of the Motor Car

By David Penn-Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the 124th installment of a weekly series of articles begun in MOTOR AGE, issue of June 29, 1916, designed to give the repairman and motorist the knowledge which will enable them to care for and repair any and all of the electrical features of the car, no matter what make or model it may be.

The first half of this series has been published in book form by the U. P. C. Book Co., Inc., 243-249 West Thirty-ninth street, New York, and is sold at \$2.50. The remainder of the series will be published as a supplementary volume.

Part CXXIV—North East Electrical Systems

ALL the various North East equipments, except the two-unit system, use a four-pole compound-wound motor-dynamo with a single armature and one commutator. One or both of the fields and the armature are used in both starting motor and generator actions. The various single-unit types which have been manufactured to date are designated as models A, B, D, E, F and G.

Model A Electrical System

The model A electrical unit is connected to the engine crankshaft by a silent chain and a set of intermediate gears. The

gears are between the shaft of the electrical unit and the chain sprocket wheel and are carried in a gearbox which is mounted on the same bed plate as the electrical unit.

The internal connections of the electrical unit and combined electromagnet cutout and regulator are shown in Fig. 211. The battery is composed of eight storage cells and is called a 16-volt system. A wire is connected to the center of this battery and led to the lamps so as to furnish 8 volts for the lights between this center wire and each outside wire.

The starting switch is of the type commonly known as the kick type and is mounted on the toe board within easy reach of the driver. The switch normally is held in the open position by a coiled spring. The first motion of the starting switch connects the armature of the electrical unit and the series field winding in series with the battery, and further movement of the switch short-circuits the series field winding.

When the engine starts to operate under its own power a voltage will be generated in the armature winding of the electrical unit, and when this voltage is high enough to charge the battery the circuit between the electrical unit and the battery is closed. The charging current is prevented from exceeding the normal value of approximately 7 amperes by the regulator, whose winding is connected in series with the charging circuit. When the current exceeds the value for which the regulator is adjusted the armature is drawn over and a resistance introduced in the shunt-field circuit. When the charging current decreases to its proper value the contacts close and the voltage again starts to build up. This operation is repeated at a rapid rate, and the charging current is maintained practically constant. The combined cutout and regulator is located in a compartment at the drive end of the shaft, which is covered with a plate held in place by four bolts.

In the combined cutout and regulator originally manufactured a permanent magnet was used to form part of the magnetic circuit, but this type later was replaced by an improved form of combined cutout and regulator in which the cutout and regulator have independent magnetic circuits. The improved type is shown in Fig. 643. The electrical unit should not be operated with the battery removed, unless the brushes are raised from the commutator or the fuse in the shunt-field circuit is removed.

Model B Electrical System

Two types of the model B system have been made, one to be used with a 16-volt system and the other with a 24-volt system. In the case of the 16-volt system the lamps operate at 8 volts as in the previous model, while in the 24-volt system the lamps operate at 7 volts. The shaft of the electrical unit is connected to the crankshaft of the engine by a silent chain and set of gears as in the case of the model A system.

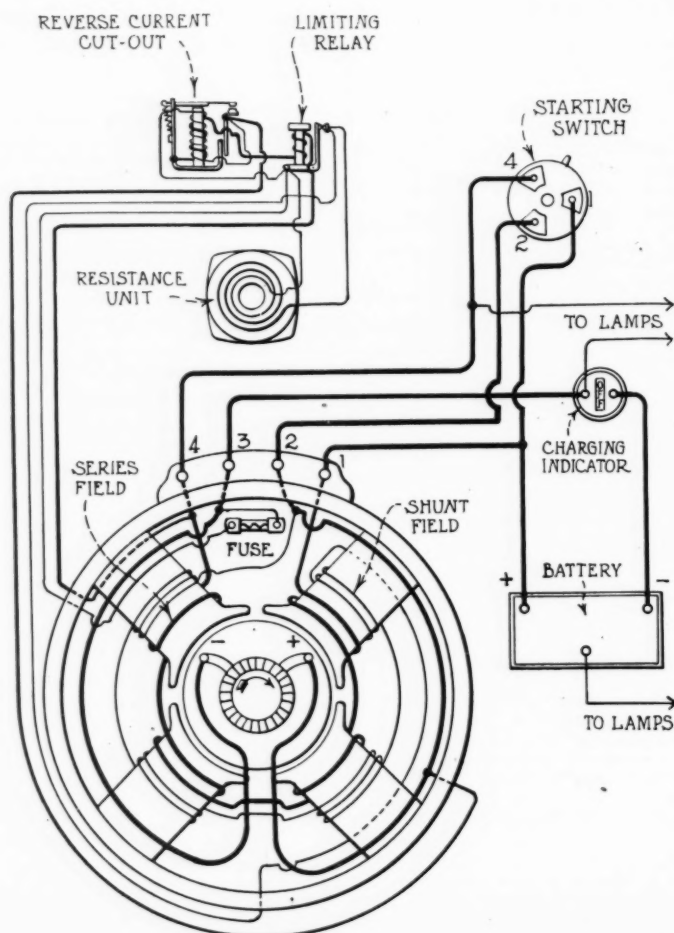


Fig. 643—Internal connections of North East model A system with electromagnetic cutout

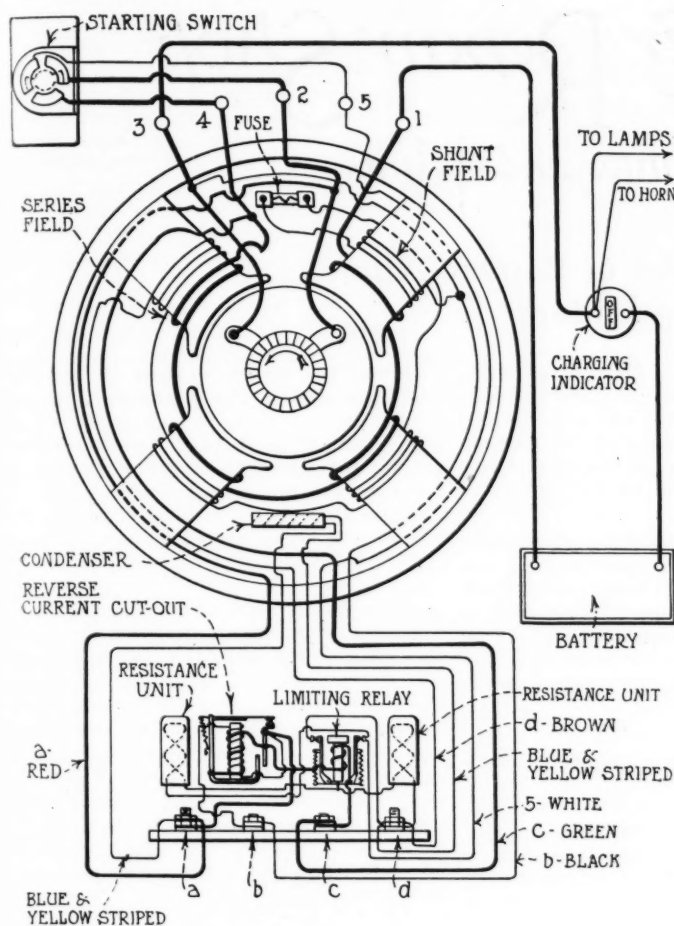


Fig. 644—Internal connections of North East model B system

The internal connections of the electrical unit and the combined electromagnetic cutout and regulator are shown diagrammatically in Fig. 644. The starting switch is located on top of the electrical unit and is operated by an arm leading to a foot pedal on the toe board in front of the driver. The starting switch has three stationary contacts, which are short-circuited by the movable arm when the pedal is depressed. Two remain short-circuited when the pedal is released. In starting the series field and armature are connected in series with the battery and the shunt field is connected across the armature, and when the pedal is released the series field is opened.

The cutout closes the circuit between the electrical unit and the battery when the voltage generated in the armature winding is ample to charge the battery. The regulator in this model is very similar to the one used with model A.

The regulator and cutout both are located in the compartment under the commutator and covered by a pressed steel housing.

The electrical unit should not be operated with the battery disconnected, unless the brushes are raised from the commutator or the fuse is removed from the shunt-field circuit.

No production of a foreign type of engine would have produced any corresponding result. The difficulties, troubles and delays would have at least equaled those experienced on the Liberty, and the result would have been much less satisfactory.

That the result has been satisfactory is apparent from the entire course of aviation during the last few months, which is illustrated by the three following incidents:

1—The English aviation authorities

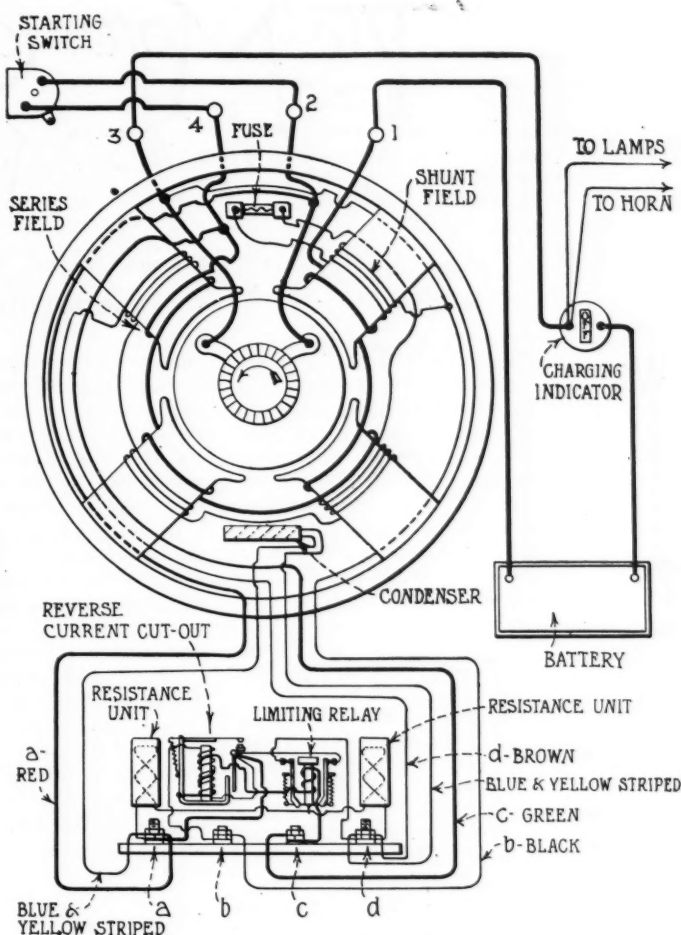


Fig. 645—Internal connections of North East model D system

Models D, E and F are practically identical in their construction, connections and operations. In some cases a 24-volt system is employed, while in others a 12-volt system is used. The lights are operated on 6 volts in the case of the 24-volt system and on 12 volts in the case of the 12-volt system. The internal connections of the model D system, with binding post terminals and the combined cutout and regulator, are shown in Fig. 645.

The starting switch is located under the toe board within easy reach of the driver. Closing the starting switch connects the armature and series fields in series with the battery, with the shunt field winding connected across the armature terminals. When the voltage of the generator has reached a sufficient value to charge the battery the cutout contacts close and connect the electrical unit to the battery. The output of the electrical unit is regulated by the same method as used with models A and B.

The tension in the driving chain is adjusted by an eccentric adjusting ring in the front flange of the cylinder block. This ring fits over the forward end of the electrical unit. The unit is supported by two adjustable V blocks and held in position by a steel strap. There should be about $\frac{1}{2}$ inch up and down movement in the chain.

U. S. AIRPLANE PRODUCTION

(Concluded from page 26)

cabled in June, 1918, that the Liberty engine test had shown it to be a satisfactory aviation engine and that it was America's greatest contribution to the aviation activities of the war.

2—Count Poiniatowski who is the official representative in this country of the Hispano-Suiza Co., stated that Mr. Bir-

right, who is one of the leading French aviation engineers, after examining the first three Liberty engines sent by us to France, stated that they excelled any engine of that type or size which had been developed in France.

3—The experience of the aviators on the front and their opinion of the Liberty engine as given to us by Major Brett on his return from France is that it is the most satisfactory engine to operate available.

The Motor Car Repair Shop

Practical Maintenance Hints

How to Get Most Out of Battery After Generator Failure

WHEN the generator fails and reliance must be placed in the battery for starting, lighting and ignition it is well to follow a little science in using up the precious store of current.

In the first place, knowing the ampere-hour capacity and its approximate condition, it is easy to make a fairly accurate guess as to what the battery may be expected to do. Suppose, for example, that it is a 100-amp.hr. battery. Incidentally, the term means that this battery, theoretically, at least, will give 100 amp. for 1 hr., 1 amp. for 100 hr., or proportionately, any current flow between.

This is assuming that the battery is fully charged and in the pink of condition. If the battery is not fully charged, or if its life of usefulness is nearing its close, the rated capacity must be discounted somewhat.

Thus, the stock of electricity on hand, if we may use the term, is determined with reasonable accuracy. If our stock is small, it may not be advisable to use the starter at all. On the other hand, if the battery is well-charged and not too much current will be required for lighting and ignition, it may be permissible to use the starter.

Likewise, knowing by reading the ammeter how much current is required for ignition, in case the ignition apparatus calls for a measurable quantity, it is easy to figure what is available for lights during a given time. By taking into account the current used for ignition and that called for by headlights and sidelights, it is possible to show whether there is enough to run the headlights during this period or whether their use must be avoided all or perhaps part of the time.

This method of calculation is really of great advantage when a long night run or perhaps several night runs must be made without the generator and without opportunity to recharge the battery. Also, when it is just a question of getting home when the generator fails. Quite often under these circumstances the battery is low, the generator having been producing less than the requisite amount of current before finally giving out.

Effective Splices

Much trouble comes from old wiring systems, both in matters of ignition and starting and lighting, particularly where it has been necessary to splice wires for one reason or another.

There is a right and a wrong way to bring two ends of wire together so it will be as useful as a whole piece and the degree of care exercised will determine the

success of the work. It will not do to merely twist the two ends together and expect to have a job that will prevent short circuiting, to say nothing of the possibility of losing a portion of the current, the maximum of which is needed for whatever purpose designed.

It is true a high-tension line needs more care in treatment than the primary circuit, for the voltage is sufficient in itself to cause at least a portion of the current to be diverted. A high-tension current, in the first place, is beset with resistance, and electricity, like many other things, seeks a path of least resistance.

In making a good connection it is only necessary to take time to do the work well. At least 2 in. of each end should be uncovered from insulation and the strands of wire gently scraped with a dull knife. They should be placed parallel, as shown in A, with about 1 in. separating the insulation. Then the copper strands should be twisted as closely together as possible, as shown at B, C and D.

When the strands have been brought together all the way, a drop of soldering acid should be touched to the wire and then a drop of solder. With the iron held there a moment, it will cause the solder to run all through the strands and set them into a solid mass, causing a thorough connection.

This part then should be covered carefully with a half width of tape, built up to practically the size of the insulated covering. Before you have proceeded to

connect the strands of wire together put over one end of the insulation a piece of small rubber hose, enough to cover the splice for at least an inch on either end. After the job of splicing has been accomplished the hose can be pushed over the splice, so that it is equally placed, and there will be no chance for a short-circuit through exposed wire or even if soaked in water.

This same treatment may be accorded a connection where a terminal has been attached to the wire; that is, twisting and soldering the wire at the splice, taping and then sliding over the splice a piece of small hose. This will be especially good in the case of terminals used for spark plugs, for the hose covering will make a suitable insulator to take in the hand in testing the plug.

Paint's Utility

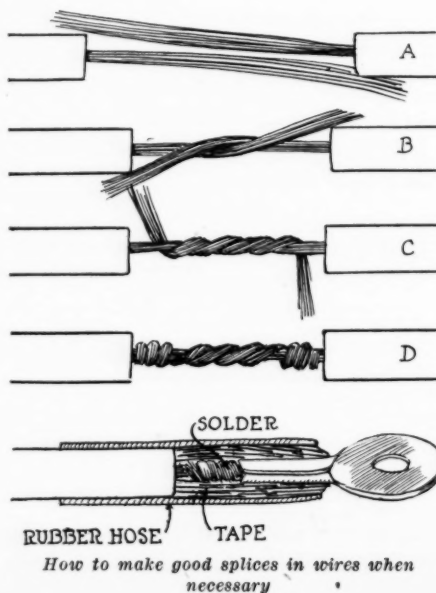
Paint is too often looked upon merely as a beautifier. It should not be forgotten that it is just as important as a protector of surfaces against the elements. When paint begins to chip off on an old car, the attitude is, too often, one of indifference.

"The car looks like the dickens, so why bother about a little paint?" And then, before it is realized, parts are allowed to go to irretrievable destruction. A fender or body panel pitted with the ravages of rust cannot be redeemed by paint. The scars will never come out.

Thin metal parts, particularly fenders, are often so weakened by rusting that they fail by cracking. Many dollars may be added to the life of the car by using paint at the proper time as a preservative. If you cannot afford to have a good job done, get busy with paint and brush yourself; an amateurish application of this vital protecting skin will stave off old age and is well worth while, even though it does not add much to the appearance of the vehicle.

When Wheel Bearings Fail

When a wheel bearing gives away completely the wheel will likely come off, the car be wrecked and perhaps some of the occupants killed. The reason is simple. The bearing holds the wheel on, and when it fails there is nothing but the wheel spindle to hold the wheel on, if it is a front one. If it is a rear wheel, the situation is not quite so serious, since the axle shaft will pull out with the wheel until its inner shaft end is no longer in mesh with the differential gear which drives it. There-



fore, since driving effort stops, the car must stop, or at least warning is given that something is wrong. This warning occurs, usually, before the axle is pulled out far enough to bend or break, or before it is entirely out.

Many serious accidents caused by cars turning turtle, hitting telegraph poles, etc., blamed on the steering gear might well have been caused by the failure of front wheel bearings.

The most important preventive measure is to see that the bearings never run dry from lack of grease. Second, the wheels should be shaken every fortnight or so to see whether there is undue play. Finally, the bearings should be adjusted or replaced before they are so badly worn that they may fail.

Whenever an unusual sound is heard around the wheels, especially the front wheels, it should be investigated. It may be caused by lack of grease, or may be the first warning note of a bearing defect which will ultimately cause failure unless attended to.

It might be well to add that when rear wheel bearings give way the only immediate indication is the noise thus produced. If the car is noisy or the rate of travel fast or the ground rough, the sound may not be heard. Hence, the necessity of keeping on the alert.

When the bearings have failed completely the wheel will ride on the brakes. The added friction, although it will increase the load on the engine, will not be taken seriously, because it is not unusual for a machine to develop a lack of power. Burning paint on the brake drum, if smelled, will tempt the driver to investigate, but if this symptom is not noticed, the final indication will be the pulling out of the wheel when the car rounds a turn which is an inside one for this wheel.

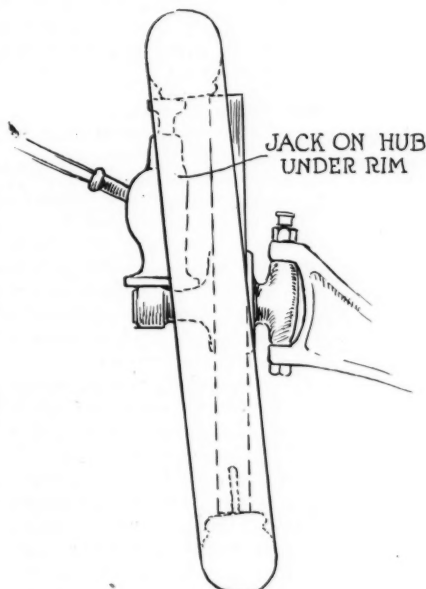
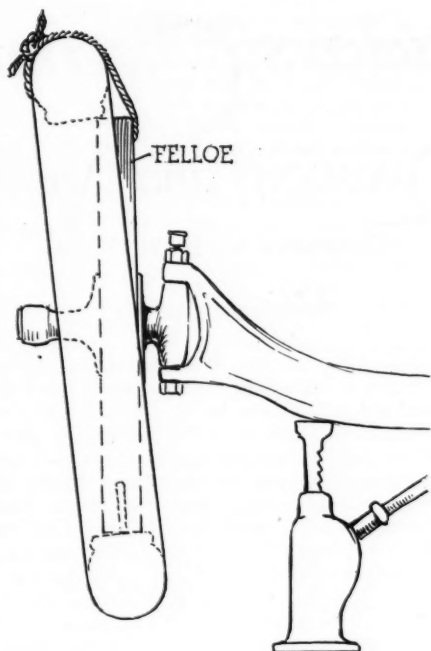
It is worth while noting that if the turn is a sharp one the wheel will come off entirely. Also, if this action takes place while swerving around another car, the extended wheel may collide with it, perhaps causing serious damage to both machines.

Repairing Pipe Line

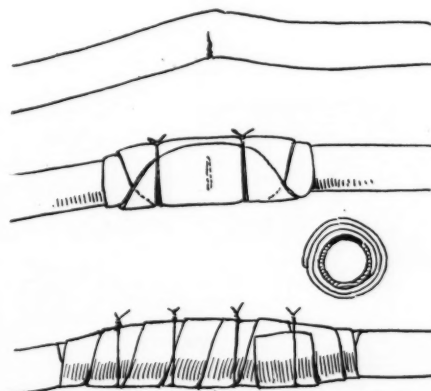
You have been told never to use rubber to make repairs where gasoline is apt to come in contact with it, but it will serve as a capable and quick repair medium in some cases and has been known to hold out for months without causing trouble in any way.

A pipe that has been entirely severed can be brought up under this repair quite as successfully as where a leak has developed at only a crink in the line, brought about through a sharp bend.

An ordinary round rubber tube patch first is used in the operation, after the gasoline has been shut off, of course. This is wrapped closely around the pipe right at the point of breaking or splitting and should be held in place by twisting two comparatively small and flexible wires around to hold the patch in place and to act as tourniquets to hold back the gasoline. If there is a long split in the pipe to be repaired, just that much longer patch will be required and perhaps four tour-



The two steps in using a jack to spread rim so it will go into place



Method of using rubber for quick repair of pipe line

niquets will be necessary to do the work.

Then tape should be bound around the patch, after the ends of the wire have been laid down to the rubber, and the tape pulled taut. This in turn should be held in place by two or possibly four tourniquets in the shape of wire, twisted so as to hold the tape down securely. The tape alone would be apt to prevent gasoline leaking, but the rubber makes a safer job. So little rubber could get into the gasoline line that it would not be worth worrying about, and inasmuch as the rubber cannot get away it will act as a thorough dam.

Overcoming Balky Rims

Demountable rims, after long use and frequent changes of tires, are quite apt to become out of shape or out of round, usually at the break or fastening. Under such circumstances a rim is difficult to handle and frequently sets up a desire not to go over the felloe band.

Excessive use of a heavy hammer only makes matters worse, just as it does with many other parts of a car where the fit is close.

If you have a second jack, the matter becomes simple, for this can be used to spread the rim enough to permit it to be put into place, when it will frequently straighten itself out through application of the holding lugs.

But what if you do not happen to have the second jack? Right here let it be suggested that an extra one is a very handy tool for more purposes than one, and particularly if the first one becomes out of order or a part happens to become lost.

Here is a simple remedy. Set the spare rim on the felloe band at the valve stem, of course. Then turn the valve stem side down, first having tied the other side so it will not fall away. If you have a companion, have him hold the rim in place. Then let down the axle by the jack that is under it. The wheel will be resting on the tire, and the jack may be removed and placed between the hub and the rim. A little pressure by working the jack easily and quickly will spring the rim sufficiently to permit a sharp blow with a hammer to set in place.

It will then be wise to again jack up the axle so the retaining lugs may be set to place evenly.

In doing this it should become a practice to see that one is not in farther than another, that is, there should be an equal space between rim and felloe band all around, otherwise the rim is slightly out of round, which means a thump on the bearings and probably uneven riding on that one wheel.

Keep Tanks Clean

Don't dip into the gasoline tank with a handful of cotton waste when you have something to clean. Cotton waste can cause more trouble with the carburetion than any amount of dirt. Incidentally, every precaution should be taken to keep the gasoline tank clean. Always strain the gasoline through a chamois filter and if you use a measuring stick be sure that it is always clean before it is inserted. See, also, that the surface around the tank is clean before removing the filler cap.

The Readers' Clearing House

Questions and Answers

Conducted by B. M. Ikert

Engine Smokes at Low Speed

Q—My 1915 Ford has run about 7,000 miles. There is no carbon and the cylinders are to all appearances perfect. Still at slow speed the engine smokes considerably. Do you think the piston rings ought to be changed? I always run with a rather low mixture and drive the machine considerably.—John B. Faisant, Depew, N. Y.

It is evident oil is passing the rings unless you are keeping the level too high. When the oil level is high the increased crankshaft speed will take care of the extra oil, whereas at lower speeds it will not and the crankcase fills faster than it is used. Try cutting down the oil level a little, but not so that it may cause a shortage of oil. If this does not prove a remedy fit new rings. Having run only 7000 miles, the cylinders and pistons should not need attention unless scoring has taken place.

Adjusting Clutch Brake

Q—Will you tell me how to make adjustment of the following? In passing from neutral into first speed I have to exert an undue pressure on the clutch pedal, sometimes to such an extent that the engine stalls. The changes while the car is running are made without any difficulty and silently. I have to keep the pedal pressed down at least 10 sec. before I can get into first.—Ross Cameron, Hamilton, N. Y.

Your clutch brake needs adjusting, to stop the clutch plates from rotating and possibly the clutch lever also needs the slack taken out to separate the plates more than they do at present when the clutch is disengaged. The fact that you keep the clutch lever pressed down several seconds indicates the brake is not effective. This can be adjusted under the car; in fact, both clutch brake and clutch itself can be adjusted from this point. It will be readily seen how the play in the clutch lever can be taken up, but care must be observed to leave a little play, so there will be no binding to prevent the clutch plates from coming together.

In Fig. 1 the adjustment is made clear. Loosen the locknut A, first holding the shaft with a wrench on the square end C.

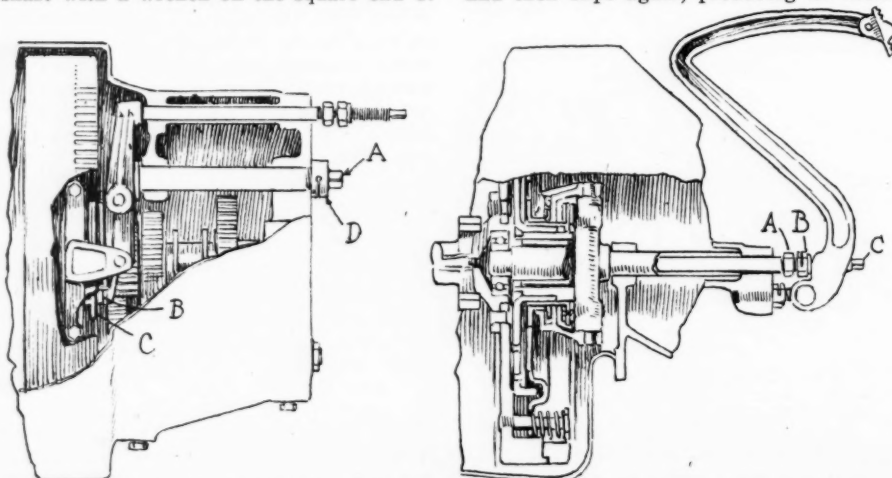


Fig. 1—How to take up play in the clutch lever, left, and adjustments for clutch brake shaft, at right

Miscellaneous

Then turn the nut B back on the shaft, leaving a little play for the foot lever. The locknut A then can be set tight.

Another shaft is shown in Fig. 1 also. This is the clutch brake shaft. Your trouble is caused by the clutch brake B not making contact with the clutch follower plate, C, when the clutch pedal is fully depressed. To adjust, move the adjusting nut D in a left, or counter-clockwise, direction until a contact surface is obtained between brake B and plate C.

This ought to remedy the trouble. Bear in mind that in engaging the low-speed gears it should be accomplished with a quick throw and not one that permits the face of the gears to grind and have the engine speed at the lowest.

Gear Ratio of Dodge

Q—Give gear ratio of the Dodge Brothers car in reverse, low, second and high?

2—When I get up to 15 or 20 m.p.h. and run steadily a peculiar rattle begins. What can this be? It is the engine somewhere, possibly a bearing.—C. W. Harter, Jr., Hobart, Okla.

1—This varies, the touring car, sedan and all special models being 4.166 to 1 on high, 7.986 to 1 on second and 19.44 to 1 on low and reverse. The roadster gear ratio is 3.615 to 1 on high, 6.93 to 1 on second, and 16.87 to 1 on low and reverse.

2—This may be caused by several things, but it is likely the starter chain is slightly loose and causes the noise. Is it not a whirring sound rather than a rattle? If so, look at the chain. If it is a heavy sounding rattle, as you describe it, perhaps the last crankshaft bearing needs taking up, as this, if loose, would permit the shaft to wallop under the rotation of the flywheel. There is some possibility of the clutch leather being worn and that the clutch slips slightly, grabs immediately and then slips again, producing an inter-

mittent noise. To determine if the clutch is slipping, set the emergency brake slightly when running in high and then speed the car. You will be able to tell whether the clutch is carrying the car as fast as it should. There is little likelihood that any other bearing is causing the trouble.

Reinforcing Weak Spring

Q—Would you advise reinforcing a weak front spring, semi-elliptic, by the addition of one or more new leaves?—J. Ballantine, Hamilton, N. Y.

This procedure is perfectly proper if you are sure it is necessary. In the Hupmobile 32 the maker purposely put in an extra leaf in the left front spring to take care of the extra weight of the battery, which is located on the running board and, being so far out, carries considerable leverage with it. Perhaps your springs need re-setting, which will overcome your trouble, at least for a while. Still, where a car is used by the driver only to a great extent not frequently the right front spring sags, and in this case an extra leaf in that spring will remedy matters.

Sundry Questions Answered

Q—How many gallons of water will an Overland 1916 hold? In mixing alcohol and water, what amount of each in proportion to the other?

2—What is the speed record of the steamer car?

3—In making a hole for a 1/8-in. pipe tap what size drill is used?

4—Where can I obtain a set of pictures of motor car racers?—P. Asquin, Chicago.

1—You do not say what Overland of the 1916 family you refer to, but probably to the light four, which has a water capacity of 3 3/4 gal. Much will depend upon the temperature when using an alcohol-water anti-freezing solution. This table will serve for all temperatures, but be careful to use a freezeometer to determine proportions and this should be tried frequently:

Percentage in Water	Freezing Point Fahrenheit
5	25
10	18
15	11
20	5
25	-2
30	-9
35	-15
40	-23

2—Frank Marriott in a specially-made Stanley steamer covered a mile straight-away on the Florida beach in 28 1/2 sec.

3—For 1/8-in. pipe tap, which gives 27 threads to the inch, use a 3/16 drill.

4—N. Lazarnick, New York; Howe & Arthur, Karpan building, Chicago; and Burke & Atwell, Chicago, are photographers who have made a specialty of photographing racing men and cars for years.

Attacking Shock Absorbers

Q—Would it be possible to equip a 1918 Buick light six with shock absorbers at the front end of the back spring?

2—What will clean curtain lights of the yellowish color?—M. C. Bates, Independence, Mo.

1—No advantage could come from putting shock absorbers on at the front end of the springs on any make of car. These are of the cantilever type. The proper place to fit shock absorbers will be between the frame and the back axle. Some form of snubber we believe will work nicely with cantilever springs, tending to hold the body down and preventing sideways as well. These at the same time will take the place of rebound straps.

2—Ordinary cider vinegar, heated, will prove the best thing to clean celluloid side lights, and, to a generous extent, will take out the yellow cast.

Adjusting Empire Clutch

Q—The clutch in my 1913 Empire, model 31, has begun to slip. Show illustration of this clutch and give instructions for adjustment. This car has run about 13,000 miles.—Hubert Suill, Ontario, Can.

To increase the clutch spring tension remove the clutch cover and turn the engine over until the locking plunger A, Fig. 2, which pins flywheel and compression plate B together, appears. Pull out this plunger and turn it a quarter turn to hold it in a disengaged position. Disengage the clutch the full length of pedal travel and lock it firmly in this position by using a stick of proper length braced against the front seat heel board. Turn compression plate B to the right by a bar or wrench, C, until the locking plunger coincides with the next hole, D, in the flywheel. Return the locking plunger to its seat, try out the clutch and repeat the entire operation, if necessary. Do not attempt to make any adjustments on the clutch unless it is fully disengaged. The adjusting plate, B, cannot be moved in either direction with clutch engaged.

To decrease spring tension remove the plug in the flywheel housing, and turn the engine over until the small hole in the flywheel rim appears. Insert a bolt or pin in this hole to lock the flywheel and then proceed exactly as outlined for tightening the clutch, the compression plate, of course, being rotated in the opposite direction, to the left instead of to the right.

Trouble with Starting Gear

Q—I have a Chevrolet, Royal Mail roadster, on which the starter starts so quickly it breaks the teeth out of the starting wheel. What causes this? Give instructions for replacing this wheel with a new one.—Harley O'Neal, Rankin, Ill.

This appears to be a case of trouble with the Bendix starting gear, or, in other words, the driving pinion B, Fig. 3. This to work successfully and not to cause trouble must be absolutely free on the spiral shaft D, upon which it operates. It must be kept clean and must not be oiled, although this seems contrary to all laws governing motor car instructions. It is the rotation of the starter shaft that operates the pinion, which is held in suspension—and is prevented from rotating with the shaft—by the heavier portion of the flange on B. There is a possibility that the thread inside the collar C has become stripped or the threads crossed, which would prevent the collar from going as far as it should, and this would also cause trouble. See that this is screwed up as far as possible. Again, if there happens to be a small kink

TO assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, MOTOR AGE segregates inquiries into divisions of allied nature. Questions pertaining to engines are answered under that head, and so on.

MISCELLANEOUS

John B. Falsant.....Depew, N. Y.
Ross Cameron.....Hamilton, N. Y.
C. W. Harter, Jr.....Hobart, Okla.
J. Ballantin.....Hamilton, N. Y.
M. C. Bates.....Independence, Mo.
P. Asquin.....Chicago
Huber Suill.....Ontario, Canada
Harley O'Neal.....Rankin, Ill.
T. C. Nichols Motor Car Co.....
.....Quincy, Ill.
Floyd C. Smith.....Dunde, Iowa

THE ELECTRIC SYSTEM

John Hoene.....Cottonwood, Idaho
H. S. Howlett.....Detroit
Empire Briscoe Sales Co.....
.....Chagrin Falls, Ohio
Henry Rotermund.....Maywood, Ill.
G. S. Burghart.....Blinger, Iowa
William Boast.....Uniontown, Pa.

ENGINES

W. G. Goetzke.....Mendota, Minn.
R. C. Brown.....Fort Worth, Tex.
J. Ballantin.....Hamilton, N. Y.

CARBURETION

W. S. Bosworth.....Philadelphia, Pa.
J. Ballantin.....Hamilton, N. Y.

REBUILDING

Austin James.....Waterloo, Ill.
Charles Richardson.....Ellsworth, Ill.

No communication without the writer's name and address will be answered in these columns.

in the spring A or any portion of it, it will bind and fail to work smoothly.

Where the spring A binds or the pinion B lags and is held back through being fouled with dirt or grease or possibly a high spot somewhere on the spiral shaft, it permits the shaft to reach its maximum speed, and when the pinion finally is freed, through excessive speed of the shaft, the pinion plunges into mesh with the flywheel gear and such a quick contact is made and under such force as to break the teeth in the softer metal on the flywheel.

If the starting motor happens to be loose on the engine—and this ought to be looked

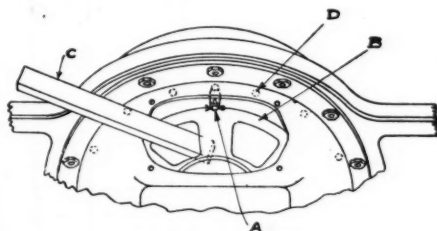


Fig. 2—Clutch on Empire 31, showing adjustments

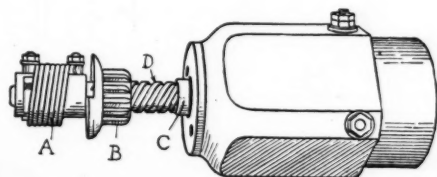


Fig. 3—Driving pinion of Bendix starting gear, which should operate freely on the spiral shaft, D

after—the trouble might come from this cause.

No trouble should be experienced in the matter of breaking the flywheel teeth if the other parts are right. It, of course, will be necessary to put in a new flywheel, but a steel band is sometimes shrunk on the flywheel with teeth out in the band. This means an expense of \$25 or \$30, and then if the pinion is not working correctly something else will give way. Try getting the units in good working shape and put in a new flywheel.

By consulting Fig. 4 it will be seen how the flywheel may be removed. Draw the pins A that connect the clutch and brake rods with the foot levers, unbolt and remove the clutch yoke shifter shaft B, remove the nuts D on the back side of the universal joint, separate the universal joint and the flywheel can readily be pulled backward and out. It will not be necessary to disassemble the clutch unit. After the clutch is out the flywheel can be removed from the crankshaft flange by taking off the nuts back of the flywheel, when a slight blow with a hammer on a block of wood held against the flywheel will start it.

Changing Paige Springs

Q—I have a 6-51 Paige, touring car, equipped with cantilever springs on the rear. What is the best kind of an elliptic spring to use on this car? What would be necessary for the change? What size should be used? I have thought of equipping the car with three-quarter elliptic springs but should like your advice on the subject. I wish to avoid continual bouncing of the rear axle as the rear wheels are constantly off the ground.—T. C. Nichols Motor Car Co., Quincy, Ill.

Three-quarters elliptic springs are about the only kind that could be used to substitute for cantilevers, but whether it will pay to make the change is doubtful. Cantilevers are used on many of the leading cars and as a rule give satisfaction. There is, perhaps, some tendency to cause sideways and rebound unless properly fitted with some form of snubbers or shock absorbers, and, as a rule, this will eliminate most of the dissatisfaction. To equip the car with three-quarters elliptic it will be necessary to have a bracket to attach to the frame to carry the forward end of the main spring and another bracket at the rear of the frame to carry the end of the small half spring. Probably any good spring manufacturing concern can furnish such brackets.

The main spring will run anywhere from 48 to 54 in., probably closer, from 50 to 52

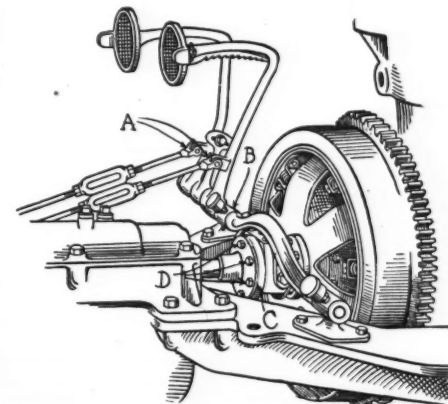


Fig. 4—Reference to this will direct the removal of the flywheel, if such is considered necessary

is ambiguous; it is not clear whether you mean the starting motor, the battery or the generator hums.

If after you have gone over the system as suggested and still the generator does not charge the battery, try adjusting the brush under the generator. Two kinds of generators were in use on this model of the Chevrolet. If it is the old model, the brush will be found under the box-like covering at the rear end of the generator—the end toward the radiator—and it will be necessary to remove this cover to gain access to the brush. Directly on the under side will be found an adjusting nut. This should be loosened and then moved about $\frac{1}{8}$ in. in the direction of the travel of the generator shaft. After a trial it may be necessary to move this brush a little one way or another; that is, $\frac{1}{8}$ in. more in the direction of travel of the generator shaft or a fraction back, toward its original position.

If the newer type of generator is in use this can be determined by comparing it with Fig. 7. If it is this type, the brush will be found underneath a band that is between the generator A and the timer C. It will be necessary to remove the strap D, which is not difficult, and the adjusting nut will be found on the under side. The regulating move will be the same as described, care being to move it with the direction of travel of the generator shaft.

If you have gone over all connections and wiring, have proved that the battery is all right and the moving of the third brush does not remedy the trouble, it will be best to send the generator complete to the nearest Auto-Lite service station.

It will be a costly job to adopt your suggestion about installing a magneto—and it is not necessary. If this is what you desire to do, it will be necessary to design a bracket to carry the magneto. If you desire to use the present generator that can be done only by setting the magneto where the generator now is and making a new bracket to carry the generator back of the magneto. The Bosch DU4 Special is made with the shaft running all the way through. This can be attached to the present timing gear coupling and then coupling the generator shaft to the other end of the magneto shaft. You can see this will be no small and inexpensive undertaking. If you wanted to dispose of the generator entirely and use a high-tension magneto for ignition, the problem would be easier, but you would have no starting system and would have to resort to some other method of lighting, for you could not depend upon a battery that had to be charged every day or so. The magneto and generator shaft travel at crankshaft speed on a four-cylinder engine.

Recharging Magnets

Q—Publish sketch on how to recharge the magnets in a magneto, what I should use and how to connect it.—William Boast, Uniontown, Pa.

To remagnetize a weak magnet it is necessary to bring it into a strong magnetic field for a short time. The actual operation of charging is simple indeed, but there are several important things to bear in mind while doing the job. The most common way of remagnetizing the pole-pieces is to use a rather large electromagnet. Let us assume you have access to an electromagnet of the four-pole type whose coils

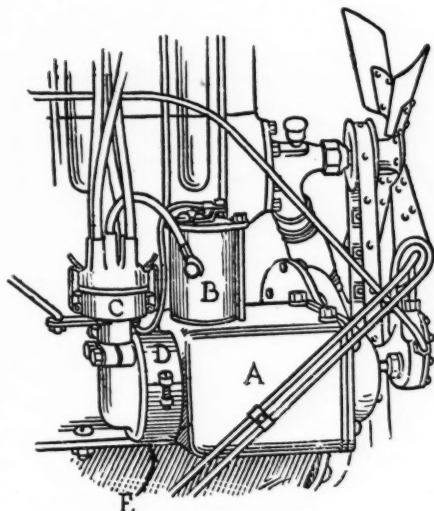


Fig. 7—Comparison with this will determine whether generator is of the newer type or not. If so, the brush is under a band between A and C

are about 4 to 5 in. in diameter and about 7 or 8 in. high.

Briefly, an electromagnet consists of a base supporting two cores around which are wound many turns of insulated copper wire. The spools are wound in opposite directions and the inner ends of the wire connected, while the outer leads go to a switch, as shown in Fig. 13. The wire generally used for such electromagnets is No. 20 B & S gage.

Remove the magnets from the magneto and place a bridge of steel across the ends of the U-shaped piece, as in Fig. 11, to re-

tain the magnetism they still possess. Usually there is some designation to tell which is the north and which is the south pole, such as is indicated by the V painted on the south pole of a certain make of magneto. But if there is nothing by which to determine the north and south poles, take a small pocket compass and hold it close to one of the poles of the magnet. As the north pole of the magnet will attract the south pole of the compass needles, or vice versa, it is easy to tell magnet polarity.

Having done this, you are ready for the remagnetizing. With a 110-volt direct current of about 5 amp. passing through the electromagnet windings, the procedure is, first, to place the magnet on end on the poles of the coils, as shown in Fig. 13, being very careful to put the north pole of the magnet on the south pole of the electromagnetic coil and also remembering that the poles must not be changed in their relation to one another once the operation has begun. While this magnet is on the coil, the current should be switched on and off very rapidly at intervals.

Care must be taken that the magnet is not over-saturated, for in that state it is useless. Ordinarily the time required to remagnetize fully a U-shaped magnet such as the average magneto possesses is about 1 min. The best plan is to leave the magnet in place on the coil for about $\frac{1}{2}$ min. and take it off. When in good shape the magnet should be able to lift a piece of steel weighing from 12 to 14 lb. If on testing it after charging it fails to do this, it must be magnetized further. On large magnetos the lifting power should be more than this. If still weak, put the magnet

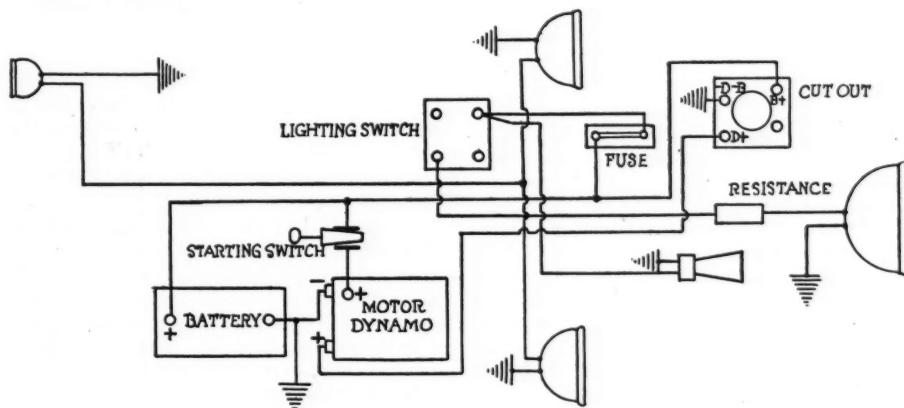


Fig. 8—Wiring diagram of electric system used on 1915 Briscoe

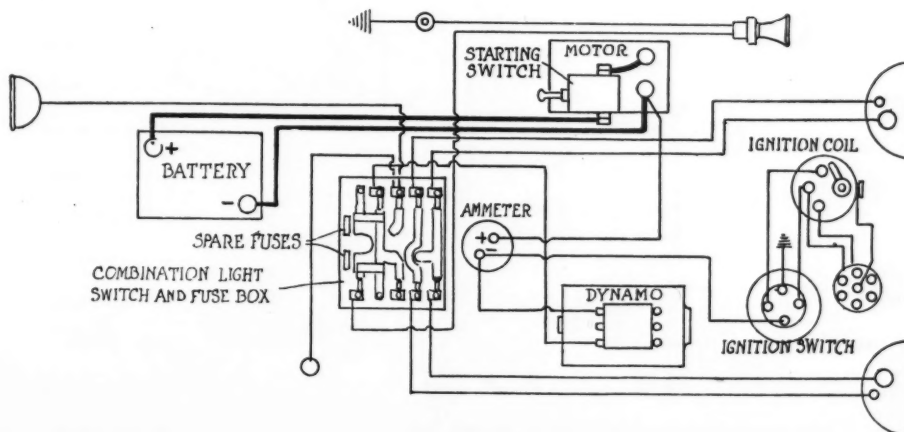


Fig. 9—Wiring diagram of the system used on the Paige 36

back on the coils and rock back and forth, being sure the same poles are in contact as before. Then turn the magnet on its side for a few seconds, these various positions being indicated by the dotted lines in Fig. 13.

Engines

Horsepower of Elgin

Q—What is the S. A. E. horsepower of the Elgin six, 1917?

2—My valve rockers are worn considerably and I find that they cost \$1.50 apiece. Would it be cheaper to have them rebored and new bushings put in?—W. G. Goetzke, Mendota, Minn.

1—The S. A. E. rating of the 1917 Elgin six engine is 21.6. This is determined through the following formula:

$$\frac{D^2 \times N}{2.5} = \text{hp.}$$

in which D is the diameter of the cylinders in inches, N the number of cylinders and 2.5 a determined constant, taking into consideration the stroke through experiment and securing an average.

2—It is doubtful if the rockers can be made as cheaply as they can be bought; this depends upon localities and the price of labor. Why not go to some reliable machine shop and procure a figure on the work? By this you will be able to determine which is more economical.

Makers of Engines

Q—What make of engine does the Stutz use?

2—What was the fastest ever made in a motor car, and by whom?

3—What engine does the Paige use? Who designed it?

4—What engine does the Willys six use? Who designed it?

5—What is the difference between the Paige engine and that of the Willys six?

6—How many different models did the Overland put out in 1916, 1917 and 1918?

Give the models of four or six.—R. C. Brown, Fort Worth, Tex.

1—The Stutz uses an engine largely after the design of Harry Stutz but made by the Wisconsin Motor Mfg. Co., Milwaukee, Wis.

2—Bob Burman in the Blitzen Benz made a flying-start mile at Daytona, Fla., April 23, 1911, in 25.40 sec., equal to 141.73 m.p.h. This is officially recognized, for he turned the trick by going both with and against the wind. Arthur Duray in a 308-hp. Fiat did a little faster time at Ostend, but with the wind and this was not accepted as official.

3—The Paige is now using a Continental

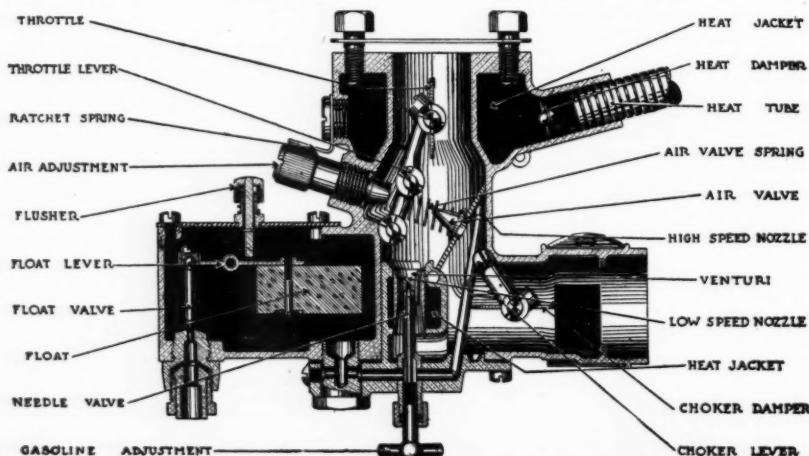


Fig. 10—Marvel carburetor used on Buick. This carburetor has a low- and high-speed nozzle

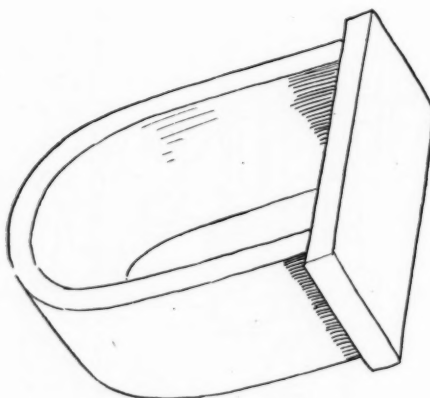


Fig. 11—A magnet should be bridged like this whenever removed from the magneto to retain the magnetism

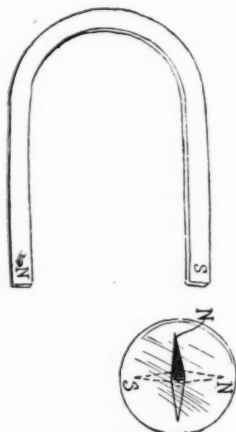


Fig. 12—How to determine the polarity of magnet. One pole will attract opposite pole of compass needle

engine in models 46, 51 and the new 55, the latest out. It used the Rutenber in models 38 and 39. The Continental is the result of development, and many engineers have been responsible for its ultimate design.

4—The Willys has the Knight-type engine, made at the Willys-Overland factory and originally designed by Charles Y. Knight, formerly of Chicago. This is a sleeve-valve engine. The Overland six is a Continental engine, while the four is the product of the Overland factory.

5—As stated, the Willys engine is of the Knight sleeve-valve type, whereas the

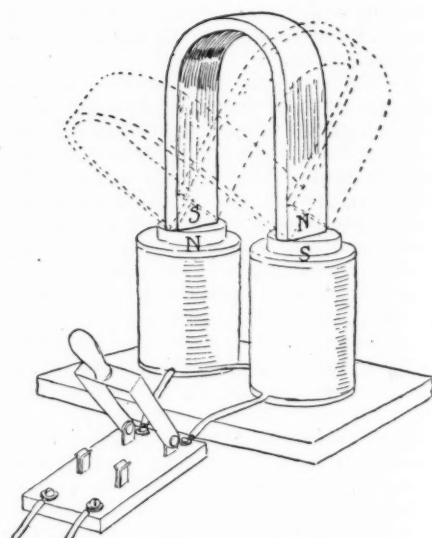


Fig. 13—Charging magnet by rocking back and forth on electromagnet

Paige is a poppet-valve type with L-head cylinders. In this engine the valves are raised by cams and closed by springs and are in the head of the engine, whereas in the Willys there are no poppet valves but two sliding sleeves, slotted so these openings, or ports, come into register at the correct and predetermined time to admit the new charge of gas and to permit the burned gas to escape.

6—There have been many combinations of bodies in the various Overland and Willys-Knight models in all years, which perhaps might be taken into consideration and called models. In 1916 the models 75 and 83 were four-cylinder cars, the 84 was the Willys-Knight and the 86 a car fitted with a Continental six.

There was practically no difference between the 1917 and 1918 models, and they were as follows: Model 84, four-cylinder Knight-type engine; 85, four-cylinder poppet-valve; 88, four-cylinder poppet-valve; another 88, a six and still another an eight-cylinder; 89, a large Continental six; 85, another Continental six, and 90, a small four.

Locating Engine Knock

Q—If an engine has a knock, and you short the cylinders successively to ascertain where the knock is, is the knock emphasized in the shorted cylinder?—J. Ballantyn, Hamilton, N. Y.

By shorting the cylinders it is presumed you mean shorting the plug to prevent ignition in some particular cylinder. This, however, would not determine the cause of the knock, for in all probability it comes from a loose bearing, and this may be on the crankshaft or a connecting rod at the crankshaft. With the ignition shut off from a particular cylinder the piston would cushion against the air and mixture just the same and on the explosion stroke the under side of the connecting rod bearing would be lodged against the crankshaft.

It is usually at the bottom of the stroke the knock comes, if it is from a loose connecting rod, and this applies to either end—the lower or the wristpin end. It is the jumping-over point, in other words, that causes the knock.

You can determine if the bearings are loose by putting the car on a hard pull,

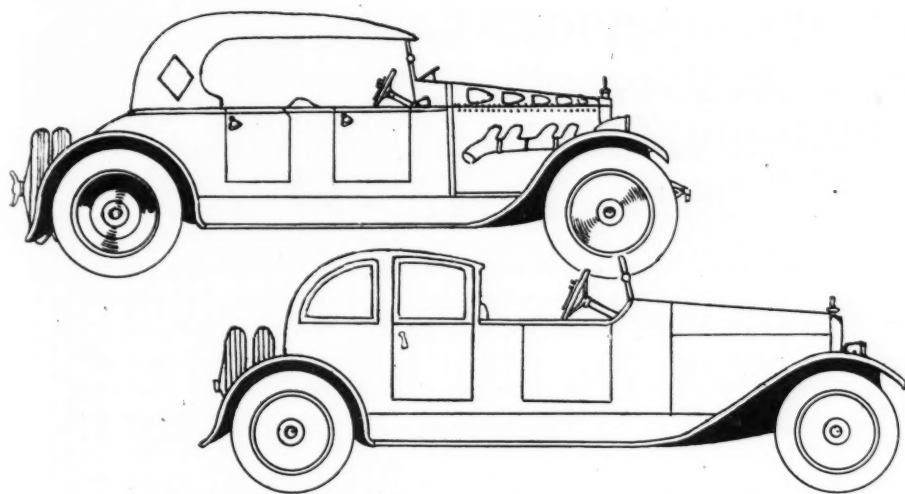


Fig. 14—Two original designs sent in by Austin James of Waterloo, Ill.

either in hard going, climbing a hill or by setting the emergency brake sufficiently to cause a pronounced drag. Then by accelerating quickly and shutting off, alternately, you will know that a bearing is causing the trouble. To remedy this it will be necessary to remove the crankcase pan under the engine and take up the bearings that are found to be loose.

Carburetion

Carbureter on Buick D-45

Q—Give adjustments on the Marvel carbureter as used on the Buick D-45.—W. S. Bosworth, Philadelphia, Pa.

The Marvel carbureter, which is used on the Buick D-45, is shown in Fig. 10. It has three adjustments, namely, gasoline, air and counterweights. But unless you have had occasion to remove or change the carbureter, there should ordinarily be no need for adjusting it, as it was adjusted properly before leaving the factory. The air regulator on the cowl board may be used to vary the quality of the mixture to conform to any local conditions of climate or altitude. The normal running position is with the button pushed clear in. When the button is pulled out as far as it will go it gives a very rich mixture for starting or warming the engine in cold weather. The leanest mixture is obtained when the button is half way out, and this should be used for coasting.

The procedure to be followed in adjusting it is as follows: First close the gasoline needle valve completely by turning it to the right. Then open it about three-quarters of a turn. Next start the engine and after it has run to warm it up push the air button all the way in to the running position. With the spark fully retarded and the throttle nearly closed turn the air adjustment screw until the engine runs smoothly and evenly. This will give you the idling adjustment.

Now advance the spark and open the throttle wide. The counterweight should not begin to lift until the throttle lever is from a third to half the way down the steering wheel sector. If it does, then change the counterweight adjustment until it acts correctly. The next step is to determine whether the mixture is too rich

or too lean and to regulate it by turning the gasoline adjustment a little at a time. The proper proportions of the mixture may be arrived at best by noting whether the engine runs better with the air regulator button pushed away in or pulled out slightly. If the gasoline adjustment is correct, the best results will be obtained when the button is pushed all the way in.

If a popping noise occurs in the carbureter when the throttle is opened suddenly and the spark advanced, then a weak mixture is indicated. Open the gasoline adjustment slightly. A sluggish engine which exhausts black smoke is being provided with too rich a mixture. If it refuses to idle with the air regulator way in, the air adjustment should be turned slightly. If it picks up sluggishly and lacks proper accelerative quality at higher speeds, the counterweight adjustment should be turned a small amount in whichever direction it gives best results.

Controlling Hot Air

Q—Where should the air control in the dash be set to admit the maximum amount of hot air on a Hupmobile 32?—J. Ballantin, Hamilton, N. Y.

If you have the original carbureter, it is a Zenith, and in this case the dash control does not exactly regulate the amount of hot air admitted to the carbureter, although for convenience it is so marked on the control lever plate.

As a matter of fact the amount of air admitted regulates the flow of gasoline through the carbureter, because the smaller amount of air admitted causes a greater suction at the spray nozzle. Then as the engine warms up the amount of air may be decreased and this automatically will less-

sen the quantity of gasoline that will pass through the carbureter to the engine.

Setting the air control at "hot" will give a greater supply of fuel and setting it at "cold" will cause the least amount of fuel to enter the cylinders. No two engines are alike, and just where this control button should be set can be determined only by experience, and again the state of the weather will have an important bearing on the correct setting.

It should be set at the point which will give the best running to the engine but as near the "cold" as will permit the engine to function properly. On a hard pull and in hillclimbing it is generally necessary to enrich the mixture a little by turning the valve toward the "hot" mark.

Rebuilding

Two Original Speedsters

Waterloo, Ill.—Editor MOTOR AGE—I am enclosing two designs for speedster models, Fig. 15. The first is a four-passenger dispatch car with Rolls-Royce type hood, straight-line, beveled body with disk or wire wheels. The second is a brougham on a Marmon chassis and has a long front fender and unique head lights. The body is low and rounded in the back. What is your opinion of these designs? Any suggestions or criticisms will be appreciated.—Austin James.

These designs would make fairly snappy-looking jobs, but we question whether the proportions are practical. Unless the rear seat is almost on the floor, there would not be head room, even in the highest part of the brougham, and the other design is not much better. Besides, the scanty head room, entrance and exit would be difficult through a door only about 18 or 19 in. wide by 37 in. deep. One would have to enter head first and leave, or rather slide out, feet first.

This would be all right for a sport model, where it would hardly be just the thing for a brougham, which usually is driven by a chauffeur. But as we said, they would make snappy-looking jobs, taking into consideration only the appearance and leaving out the dimensions indicated.

Speedster on Scripps-Booth

Ellsworth, Ill., Editor MOTOR AGE—I am sending you a drawing of a speedster body, Fig. 15, built on a 1918 Scripps-Booth chassis, using the same radiator and hood. The fenders on this car are removable, this being done by brackets set in slots and held by set screws. The front bracket is fastened to the guide rod causing the fender to turn the wheel.—Charles Richardson.

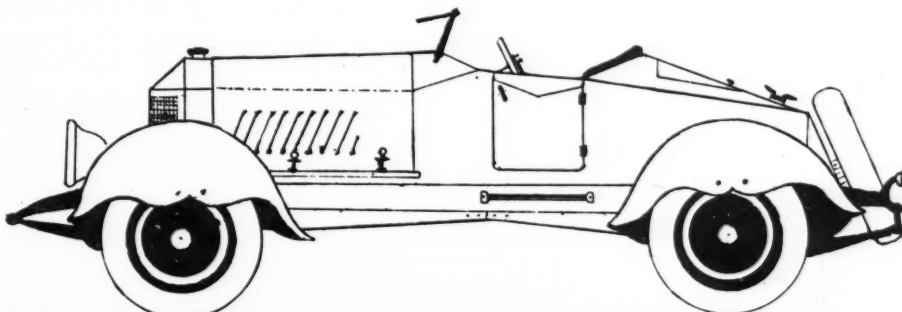


Fig. 15—Speedster body built on Scripps-Booth chassis and submitted by reader

Motor Age Monthly Guide to Truck Specifications

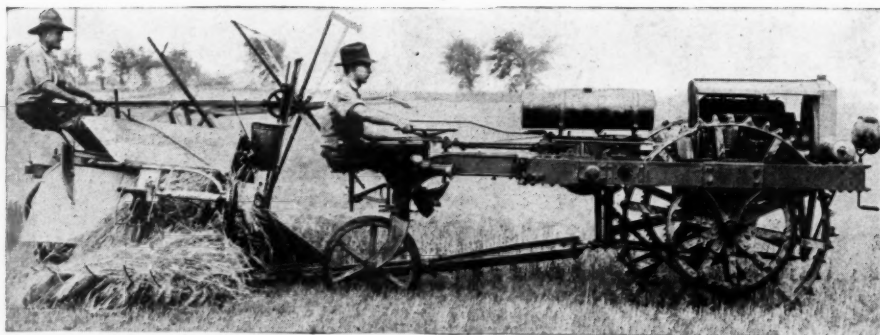
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Abbreviations: **E**ngine—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lye., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; Lo-R., LeRoy; GBS, Golden, Belknap & Swartz; Beav., Beaver. **I**gnition—Eise., Eismann; A-K, Atwater Kent; Koko., Kokomo; Solt., Splitorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite; Dyneto, Dyneto; Al-Ch., Allis-Chalmers; West., Westinghouse; L-N, Leece-Neville; Det., Detroit; N.E., North East; Wag., Wagner; Astor, electric starting also, Astor; Wauk., Waukesha; Dupls., Duplex; Cont., Continental; No., Monarch; Simp., Simplex; M-Canna, McCanna; Rugs., Ruglers; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shaks., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Eng., Ensign; Mast., Master; John., Johnson; Stew., Stearns; Tilt., Tillotson; Asterisk, vacuum fuel gauge. **B**rown-Lipe: Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&F, Merchant & Evans; Lye., Lycoming. **G**arret-B-L, Brown-Lipe; G-Lee, Grant-Lee; Det., Detroit; Mech., Mechanics; Cover, Covert; Savg., Savage Arms. **F**inal Drive—in-g., internal gear; **d**-red., double reduction; s-bov., spiral bevel; ext-g., external gear. **A**xle—Timken, Timken; Torbn., Torsionless; Key-H, Keystone-Hindly; Stel., Sheldon; Salsby, Salsbury; Ind., Industrial; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **S**tanding Gear—Gem., Gemmer; Lavne., Lavine; Warn., Warner; Dittw., Dittweiler; Jacc., Jac.; Fst., Foster; Wob., Wohlbach. **T**ires—Asterisk, pneumatic.

Motor Age Monthly Truck Specifications—Concluded

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Boring Tractor "Carries" Implements



The Boring tractor in operation. Note how attachment is made

THE tractor made by the Boring Tractor Corp., Rockford, Ill., was designed as a "carrying" machine. Its frame was made adjustable and built entirely around the power wheels with a clearance of 38 in. In this way it is possible to hang the implements to the frame. The frame can be widened to meet varying conditions, as in cultivating corn. The wheelbase is 54 in. with the frame closed and 79 in. with it open.

The Boring carries the plows beneath its frame by toggles. The plows are pulled from the extreme front end of the frame and are held rigid at the front end only, the rear toggles being used merely for lifting. The operator raises and lowers the plows any distance at will, using the lever at his right hand. The right drive wheel runs in the furrow, the steering wheel running in the furrow made by the last plow. The left drive wheel is raised the depth preferred—9 in. in the illustration.

Location of Drawbar

The starting crank is placed in the center of the front frame member, and just below it is the drawbar for the plows. The center of draft of the tractor and the center of draft of the plows is the same. Side draft is eliminated by this construction, it is claimed.

The Boring is powered with a model R Waukesha engine, which is a four-cylinder with a bore and stroke $4\frac{1}{4}$ by 5 $\frac{1}{4}$ and a speed of 1000 r.p.m. Ignition is by Kingston high-tension magneto, and a Kingston carburetor and Bennet air cleaner are regular equipment.

Cooling is by pump in combination with Perfex radiator. Lubrication is a combination of force feed and splash. Either gasoline or kerosene are used as fuel.

The belt pulley diameter is 10 in. with a face of 6 in. and a belt shaft speed of 435 r.p.m. The tractor has two speeds forward and one reverse. Its plowing speed is rated at 3 $\frac{1}{2}$ m.p.h. It weighs 3400 lb., all but 400 of this being on the drive wheels and the rest on the rear carriage.

The frame of the Boring might be designated as its main feature. This is laterally adjustable and is made of steel channel hot-riveted. It can be widened from 6 ft. 2 in. to 8 ft. 8 in. The frame is locked securely to whatever position it may be opened, and the average time required to change the adjustment from cultivating to plowing is about half an hour.

The frame is opened simply by the aid of a jack, which is furnished. By placing the jack under the frame and lifting the wheel from the ground, the machine can be opened by a crank operating a pinion running in a rack. One turn of the crank opens the frame 7 $\frac{1}{2}$ in. As the frame opens it carries with it the left drive wheel. Since the driveshaft is telescoping, this wheel takes with it its driving mechanism.

A normal gear is used for plowing and all ordinary work. The tractor in this gear has enough power to enable the operator, merely by adjusting the automatic governor, to plow at the best turning speed. A special low-speed or bulldog gear is used for extra heavy work and for slow, careful operations, as in cultivating. These speeds can be varied further by adjusting the automatic governors. All the gears are operated by one lever.

The controls automatically adjust themselves to any position of the operator. They are further adjustable to long-armed and long-legged operators. A patented pivoting device enables the operator to pivot his tractor right or left, on either drive wheel, using but one lever. The tractor pivots in a circle of 7-ft. radius.

Belt pulley, shaft and bearing are one unit and demountable. Hyatt heavy-duty

Plows Are Suspended on an Adjustable Frame

roller bearings are used, with nickel-steel gears, running in oil. The power belt shaft is mounted on these inclosed bearings and is demounted readily.

The Emerson-Brantingham Co. has made for this tractor a special 16-in. two-bottom gang plow with very short stiff beams, well braced fore and aft and fastened to very heavy frogs. Demountable shares enable the farmer to run sharp plows at all times, and different moldboards can be fitted for varying soils.

LIPPARD-STEWART REORGANIZES

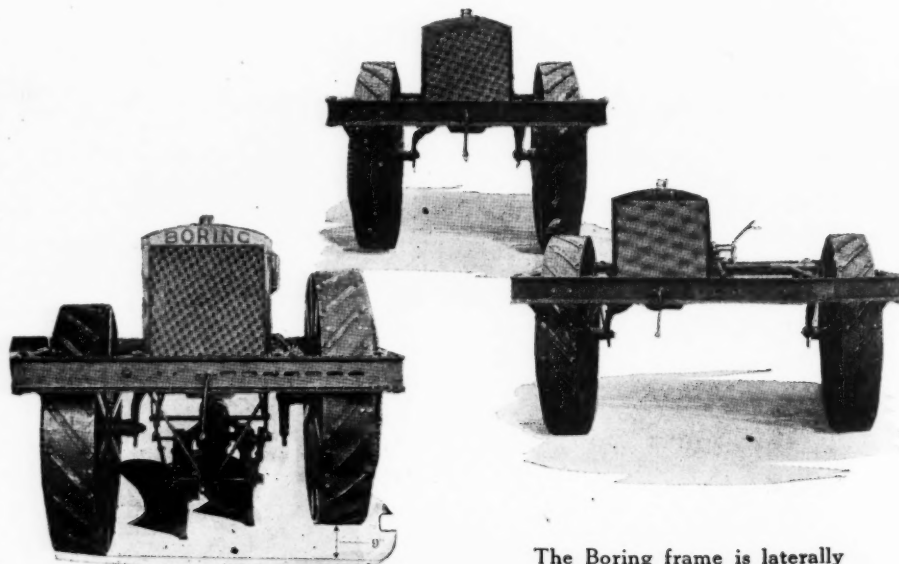
Buffalo, N. Y., Dec. 6—There has been a complete reorganization of the Lippard-Stewart Motor Car Co., in which additional capital has been obtained. The entire stock and equipment now is being moved to the company's new plant at Syracuse, where the business will be carried on hereafter. Announcements of new models, etc., will be made soon.

WOULD SAVE KEROSENE

Washington, Dec. 6—A campaign for the conservation of kerosene and coal oil has been started by the Fuel Administration. It is directed particularly to farmers, who are asked not to use oil heaters and stoves unless necessary.

UHLER BACK TO STATE

Washington, Dec. 6—Lt.-Col. W. D. Uhler, head of the convoy service of the Motor Transport Corps, has resigned and returned to his duties as highways commissioner of Pennsylvania.



How the left drive wheel of the Boring is raised

The Boring frame is laterally adjustable. It is shown above closed, left, and opened

Renault Two-Man Tank Has 40 Hp.

A Few Details as to Construction of Machine

THE accompanying illustration represents the Renault two-man tank which has contributed so largely toward the Allied victory. The first of these tanks was produced in the Renault factory in the fall of 1917 and proved to be so effective when put through its practical tests that the Government immediately decided to build several thousands, the work being carried out not only in the Renault shops but at the Berliet and other factories.

Immediately this program was decided on, a call was made for volunteers to drive the tanks. There was no lack of candidates, most of them being young men serving in the infantry. The future tank drivers were given a short course on touring cars and then put into the special tank school. On an average the men were turned out competent in one month, for the Renault tank is remarkably easy to handle, and mechanical instruction was limited to magneto and carbureter adjustments. All the men had to be capable of was taking a magneto off and putting another in place, properly timed, within 3 min.

The Renault tank carries two men, a gunner, who occupies a position in the forward turret and has charge of the two guns, and the driver who has charge of the 40-hp. engine. The weight of the tank is about 6 tons and its speed 7 m.p.h. The usual method of moving these tanks is aboard a truck, and for this purpose Renault has designed and produced a special 7-ton gasoline truck.

NEW WILLYS-KNIGHT MODEL

Toledo, Ohio, Dec. 6—Willys-Overland has started delivery on a new Willys-Knight sedan, which is to be furnished on both four- and eight-cylinder Willys-Knight chassis, the latter with wire wheels. Five-inch cord tires are standard equipment on both chassis. The body finish is French blue with black top, fenders, etc. Interior fittings are satin-silver finish.

HAYNES LINE CONTINUES

Kokomo, Ind., Dec. 6—The Haynes Automobile Co. will offer five body styles in both the six-cylinder and twelve-cylinder lines. They are the Fourdore roadster, a seven-passenger touring car, seven-passenger four-door sedan, four-passenger coupe and a limousine.

BUYING INCREASES ON COAST

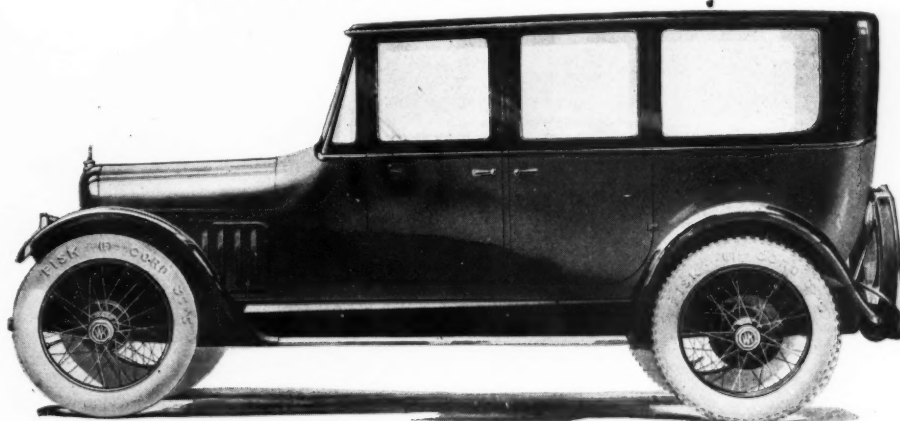
Los Angeles, Dec. 6—Quick return to normal business conditions here is predicted by the automotive dealers. Already the signing of the armistice has had its effect in more liberal buying of new cars and trucks and the number of lookers has increased preceptibly. Although victory day was observed as a holiday and all the dealers closed their places of business to join in the celebration, several sales were



Renault two-man tank which has a speed of 7 m.p.h.



Thermoid triple-disk universal joints adopted by Templar Motor Corp. to simplify construction and increase ease of maintenance



Willys-Knight new sedan, which will be furnished on two chassis

made. Some of the dealers reported sales to buyers who were not even regarded as prospects and whose identity was entirely unknown.

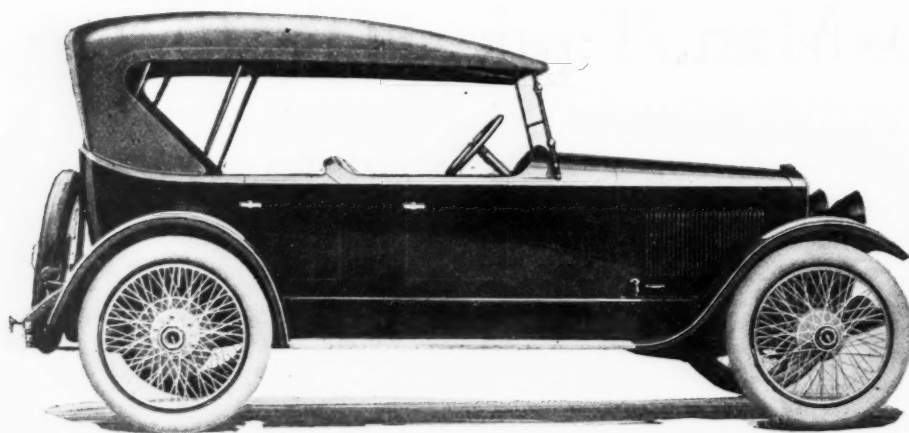
A rapid decline in prices of used cars is almost certain to follow. Several used car dealers who laid in a heavy stock of cars bought on a rising market under the expectation that the war would continue in-

definitely and there would be no more manufacture of new cars after the first of the year will have to assume a heavy loss. Owners who have had cars for a year or more and have been trying to sell them on the strength of the present high prices of new cars and thereby make quite a profit are now finding their cars unsalable at any but a reasonable figure.

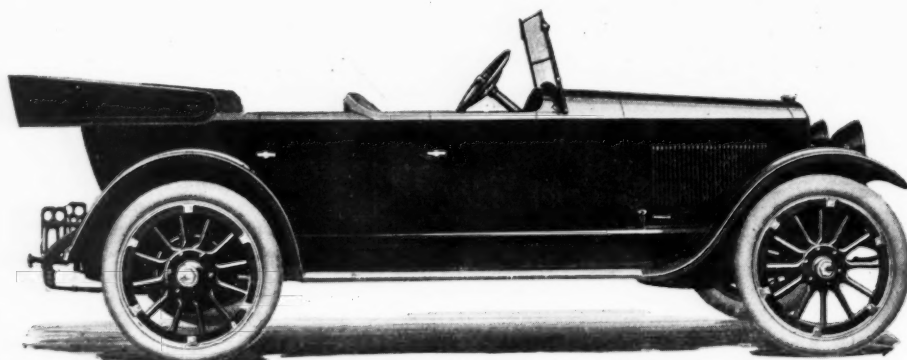
Auburn Models for 1919

Four-Passenger and Five-Passenger on 1918 Chassis for Next Year

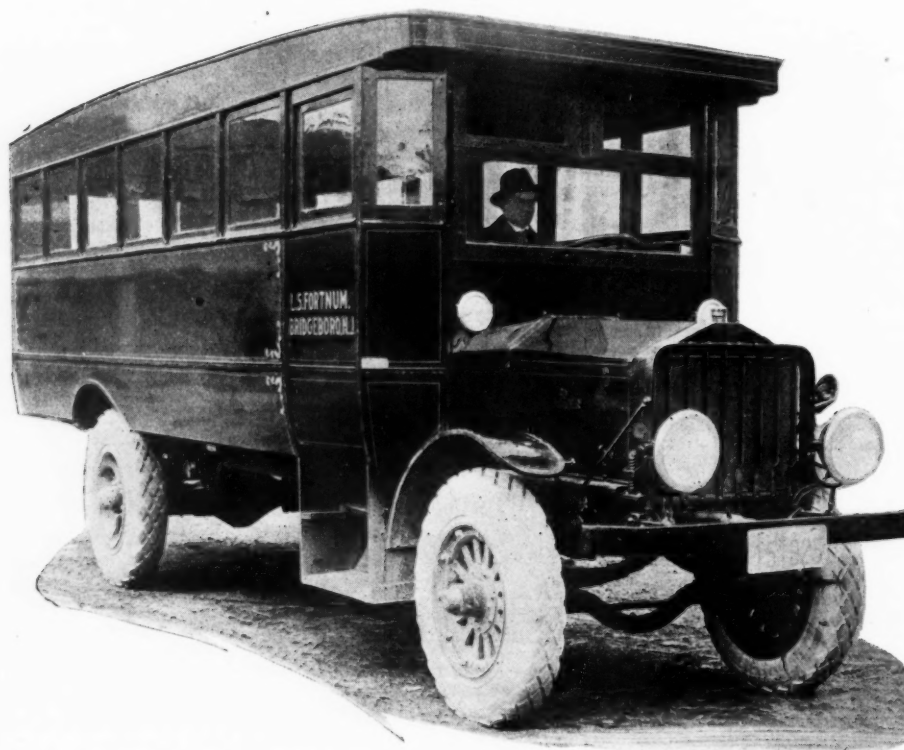
Bodies Show Change to Square Lines Throughout



Auburn 1919 four-passenger which will sell at \$1,595



Auburn 1919 five-passenger model on 1918 chassis



Rowe 3-ton pneumatic-tired truck, a 1919 addition

THE lines of the 1919 models put out by the Auburn Automobile Co., Auburn, Ind., have changed considerably to the square lines. The company will offer two cars during the coming year, the 6-39K, a four-passenger, and the 6-39H, a five-passenger. These will be mounted on the same

chassis as the 1918 model 6-39 and sell for \$1,595.

The finish of the new bodies will be in royal blue or purple lake for the bodies and hood with fenders and trimmings black enamel, and in Auburn gray. The fenders are crowned and are made of extra heavy-

gauge rolled patented flattened steel. They have a continuously inclosed front and rear, protecting the body from road wheel splash. The running boards are of good length, supported on three hangers covered with lineoleum and bound with heavy-gauge corrugated aluminum.

Equipment will include a new electric headlight with small auxiliary lights for city driving, electric cowl and taillights, all lamps being enameled black and nickel trimmed. The electric horn is concealed under the hood. A new two-piece, clear-vision, ventilating windshield is fitted. Stewart-Warner speedometer, one-man top and hood and Gabriel snubbers on front are regular equipment.

To recall briefly the 6-39 chassis, it is powered with a six-cylinder Teetor-Hartley engine with a bore and stroke $3\frac{1}{4}$ by $4\frac{1}{2}$, which develops 43 hp. at 2100 r.p.m. The clutch is a Borg & Beck and transmission is selective. Gears drop-forged from nickel steel, and annular ball bearings are used throughout.

A Rayfield carburetor is used. Fuel is fed by a Stewart vacuum system. A 6-volt Remy system provides current for starting, lighting and ignition. Lubrication is by force feed and splash, with oil gage on the instrument board. The transmission and rear axle run in a semi-fluid lubricant, and oil cups are located on all springs. The brakes are external for service and internal for emergency. Both are equipped with springs to prevent dragging and equalizers, and accessible brake adjustments. Cooling is by centrifugal pump. The springs are semi-elliptic, and the axles are drop-forged I-beam, front, and three-quarters floating in rear.

ROWE ADDS TRUCK

Lancaster, Pa., Dec. 6—The Rowe Motor Mfg. Co. has added a new model for 1919 to its line of worm-drive trucks. This is a 3-ton pneumatic-tired truck, designed specially for low speed and known as model GW.

The new truck is equipped with a Herschell-Spillman eight-cylinder engine, Brown-Lipe four-speed transmission, Ross steering gear, Sheldon axles and M. & E. universal joints. The front tires are 38 by 7 and the rear, 42 by 9. An electric motor and generator, Atwater Kent distributor and Willard storage battery are standard equipment.

The accompanying illustration shows one of the new trucks, which is owned and operated by Lester S. Fortnum of Bridgeboro, N. J. This truck is equipped with a large bus body and has been used for some time in transporting munition workers from Mount Holley to Riverside, N. J., under Government contract.

The Accessory Corner

New Fitments for the Car

Tong-Grip Tire Tool

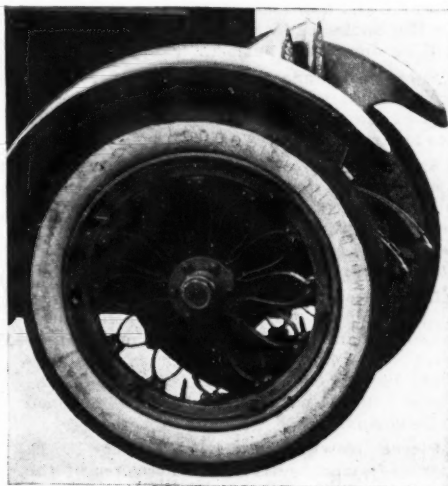
THE tong-grip tire tool, made by the Klincher Tool Mfg. Co., 1114 Hennepin avenue, Minneapolis, Minn., is handled like a pair of tongs and firmly grips both beads of the clincher tire, taking it off or putting it on with ease. No other tool is required for the operation. It sells for \$3.

Keene Tire Pump

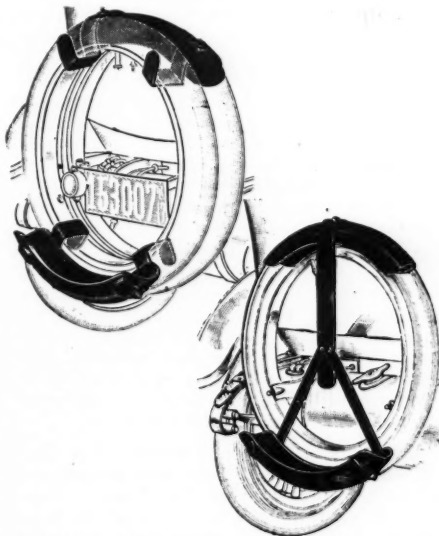
The Keene Universal engine-driven tire pump has no valves, depending entirely on atmospheric pressure and a partial vacuum. A line drawing and instruction sheet are furnished with each pump; no machine work is necessary; and the device can be attached by the owner. If it is impossible to attach the pump to the engine, a shaft-driven pump is used. This is detachable and is inserted through the starting crank bracket in the radiator. This model used a patented automatic clutch which automatically takes up differences in the same make of car and adapts itself to engine conditions.

Cylinder Heads for Fords

The cylinder head for Ford cars made by the Green Engineering Co., is sturdily built of cast iron, the inside of the head being perfectly smooth. It can be fitted on a Ford engine in about 35 min., it is said. No new holes or special bolts are required. The standard Ford cylinder head bolts already on the engine are used. The device is made for either S. A. E. or $\frac{1}{2}$ -in. Ford spark plugs. The Green Power-Plus cylinder head holds approximately twice as much water as the standard Ford cylinder head and is so designed that water circulates freely to every part that is likely to become overheated, it is claimed. It is so constructed that the largest part of the combustion chamber is directly over



Ackerman wheel with special steel spokes



Two models of the adjustable tire carrier

the valves. In truck tests the head has shown a surprising increase in power and at the same time has kept the temperature of the cylinder so low no tendency to boil water developed, the makers report.

Adjustable Tire Carrier

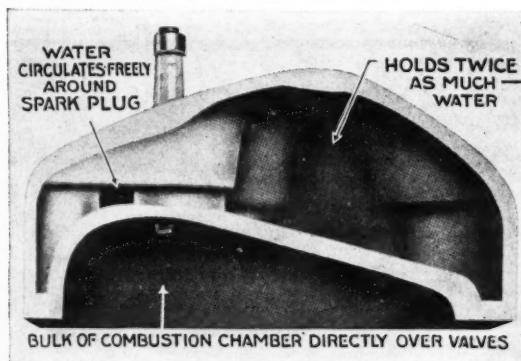
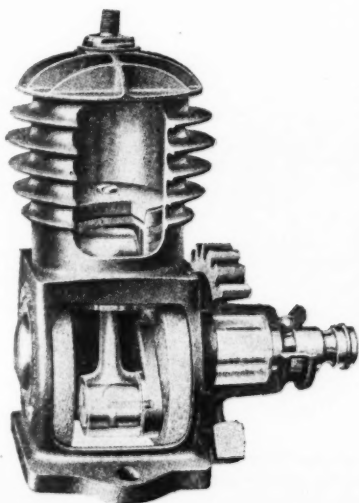
The adjustable tire carrier made by the International Stamping Co., 400-12 North Leavitt street, Chicago, fits over any rear tire and carries all the extra tires desired. Assuming the car has provision for one extra, this carrier rests on, and is supported by tire No. 1, supporting in turn tire No. 2, etc. The construction of the carriers is such they can be disassembled and packed away in comparatively small space. The cradle sections fit about a quarter of the circumference of the tire. The wide suspension bar is provided with a series of holes to receive the two narrower bars, allowing for adjustment according to tire size. Prices range from \$2 to \$6, according to model and size of tire. Two models are offered.

Ackerman Wheel

The wheel made by the Ackerman Wheel Co., Rockefeller building, Cleveland, Ohio, is so designed that with a solid or cushion tire the same easy-riding qualities as with a pneumatic tire on wooden or wire wheels, as well as increased mileage, are obtained, it is claimed. The spokes are made of a special alloy steel, heat treated and tempered to give resiliency equivalent to that of a pneumatic tire. The shock is absorbed in the spokes before it reaches the axle, thus saving the entire mechanism of the car. As arguments for the wheel the maker advances that it is many times stronger than a wooden or wire wheel, its lateral, or side, strength is very great, there being very little danger of breaking when skidding into a curb, etc. The concern is in production on wheels for Ford cars and light Ford trucks. These sell for \$60 a set. Wheels for other makes of cars will be put on the market before long, it is expected.

Tractor Garage

The Yuba Construction Co., San Francisco, Cal., is making a garage for the tractor which it calls the Tracover. It is big enough for a seven-passenger car and a tractor together and is of frame construction with shingled roof and sides on a concrete foundation with drained concrete floor. A pit is provided for working under the tractor, and there is an inclined runway. Provision is made for the storage of gasoline, kerosene, etc. There is a workbench and the building is well lighted and ventilated.



Above—Green cylinder head for Ford cars, showing cross-section

Left—Keene Universal engine-driven tire pump, which has no valves

Among the Makers and Dealers

Short Trade Notes

STEPHENS to Manage Twist Drill Sales—

G. W. Stephens has been appointed sales manager of the Detroit Twist Drill Co.

Cleveland Dodge Changes Hands—The Cleveland Cadillac Co. has taken on Dodge Brothers distribution in Cleveland, Ohio. This formerly was in the hands of the Neighbors Motor Co.

Pull-More Plant to Be Sold—The plant and equipment of the Pull-More Motor Truck Co., New Castle, Pa., is to be sold by the receiver, Dec. 27. Included is a brick building 100 by 500 ft. and 20 acres of ground.

Two State Distributors for Cleveland—Cleveland tractors are to be distributed in Arkansas by the Little Rock Motor Car Co. and in Oklahoma by the Cardwell-Lyman Sales Co. of Oklahoma City, which has been formed for that purpose.

Powelson to Manage Pittsburgh Works—J. W. Powelson has been appointed works manager of the Pittsburgh plant of the Pittsburgh Model Engine Co. He was for several years production engineer of the Rochester Motors Co., Rochester, N. Y.

Puritan Buys American Axles—The Puritan Machine Co., Detroit, has bought the entire service or repair parts business from the American Ball Bearing Co., Cleveland, Ohio. This includes parts, tools, jigs, dies, blueprints, etc., covering all American ball bearing axles made previous to Jan. 1, 1918. The stock is to be transferred to Detroit and distributed from that city.

Reed Tractor to Expand—The Reed Foundry & Machine Co., Kalamazoo, Mich., will increase its capital stock from \$100,000 to \$250,000 and develop the manufacture and distribution of the Reed tractor. E. L. Rose will have charge of tractor sales. The officers are: President, Joseph E. Brown; vice-president, E. E. Reed; secretary and general manager, J. E. Welborn; and treasurer, B. W. Raseman.

Plymouth Motors Elects Officers—The Plymouth Motor Mfg. Co., formerly the Steiner Mfg. Co., Plymouth, Wis., at its annual meeting elected the following officers: President, George W. Brickbauer; vice-president, Charles Steiner; secretary, Frank Schryer; treasurer, Gust. W. Schiereck; directors, George Gerhard, H. J. Goelzer and C. C. Arndt. The company manufactures

gasoline and kerosene engines and orders now on the books indicate that the coming year will be one of its busiest.

Sprague Is Made Assistant Secretary—L. C. Sprague has been appointed assistant secretary of the Chicago Pneumatic Tool Co., with headquarters in New York.

Speaks Is Now a Major—Charles E. Speaks, formerly manager of motorcycle and truck tire sales for the Firestone Tire & Rubber Co., has been promoted to be a major in the quartermasters' department. Major Speaks is now in France on active service.

Distributors Take on Whitney Tractor—R. R. Schlundt and Howard Schaeffer have taken on the distribution of the Whitney tractor in Ohio. This tractor is manufactured by the Ohio Mfg. Co., of Upper Sandusky, Ohio. Headquarters have been opened in Cleveland.

Pierce Now With Elwell-Parker—F. E. Pierce, formerly advertising manager of the Anderson Electric Car Co., Detroit, has been appointed district manager for the Elwell-Parker Electric Co., manufacturer of industrial trucks and tractors, with headquarters in Detroit and with factories in both Detroit and Cleveland.

English Agent to Visit Country—Capt. A. S. F. Morris, R. A. F., managing director of Morris Russell & Co., London, England, is expected to arrive in New York shortly and will make his headquarters at the New York office of the company. He will be here in the interest of this firm which is looking for representation for car accessories and parts.

Detlaff to Concentrate Production—The A. J. Detlaff Co., Detroit, hereafter will confine its entire plant to the production of clutches and control sets, which have formed a large proportion of its output since its inception in 1903. For the last year the company has been working on a 100 per cent war basis, building type B clutches and controls, type AA clutches and Quad control sets.

San Antonio Dealers Organize—The San Antonio Automobile Trade Association has just been incorporated at San Antonio, Tex. It has no capital stock and its purpose is to acquire, preserve and disseminate valuable business information; to establish and maintain uniformity in the commercial usages among its members and generally to promote

the interests of the motor car and kindred trades, and increase the facilities of commercial transactions among its members.

Cole to Manage Omaha Branch—S. E. Cole has been appointed manager of the Omaha branch of the H. W. Johns-Manville Co. He succeeds Charles F. Simms, who died.

Standard Foundry Will Add—The Standard Foundry Co., Racine, Wis., a large gray iron casting plant, has awarded contracts for the erection of a \$50,000 foundry building, 80 by 200 ft., and of brick and steel construction. It is to be ready to begin operations shortly after Feb. 1.

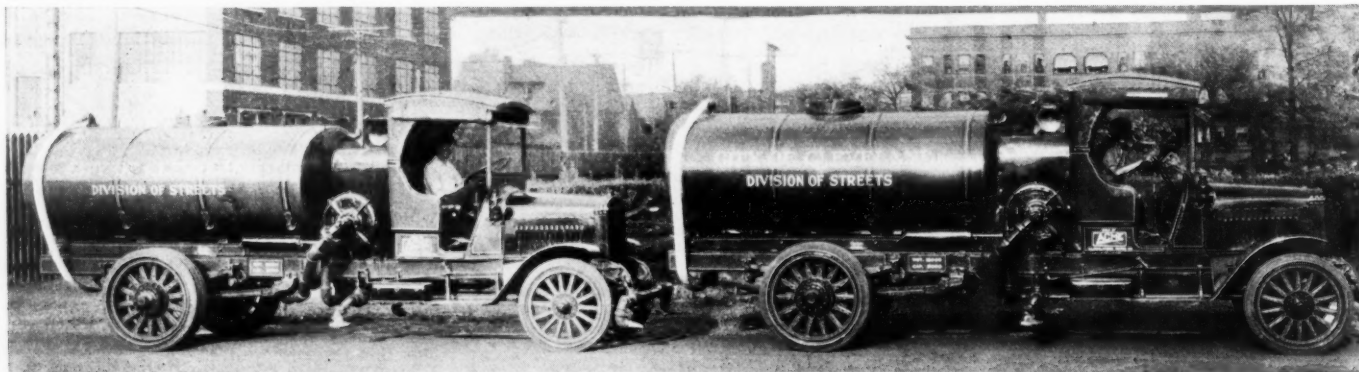
Schumacher Is Promoted—L. E. Schumacher, for the last eight years chief inspector of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been promoted to become works manager of the Krantz Mfg. Co., Brooklyn, N. Y., the latest subsidiary of the company.

Cunningham Is Oliver Works Manager—C. F. Cunningham, formerly assistant general manager of the United States Cartridge Co., Lowell, Mass., which office he resigned since the signing of the armistice, has been elected secretary of the Oliver Chilled Plow Works and works manager.

Dauch Appoints New Distributors—The Charles W. Tway Co., Atlanta, Ga., distributor of the Haynes car and Wilson truck, has been appointed distributor of the Dauch Mfg. Co., maker of the Sandusky tractor. The Briscoe Motor Sales Co., St. Louis, Mo., also has taken on the Sandusky.

H. C. Severance Is Dead—H. C. Severance, secretary and general sales manager of the Racine Rubber Co., Racine, Wis., died recently at his home. Mr. Severance had been in the rubber business for many years, serving with the Hartford and United States companies before becoming general sales manager of Racine in 1913.

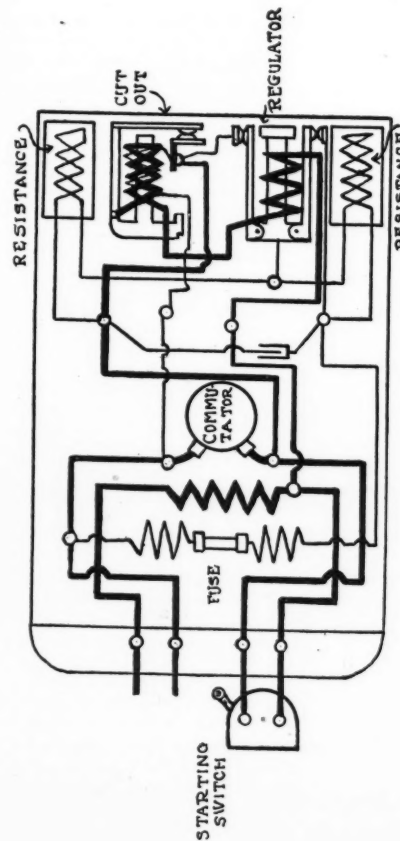
Youngest Garageman in Iowa?—Lew Harrison, who is perhaps the youngest Ford service garage owner in Iowa, enlisted in the aviation corps and is training at an aviation camp in Texas. Mr. Harrison recently built a large garage at Nashua, Iowa. He started Ford repair work when fourteen years of age and now at the age of twenty-one owns a large, up-to-date Ford service garage and sales agency.



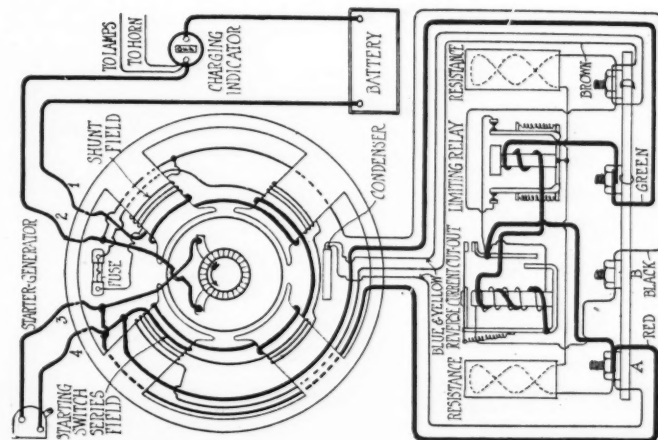
TANK TRUCKS FOR STREET DEPARTMENT—Two Acme trucks sold to Cleveland by the Englander Motor Co. of that city. The tanks are capable of carrying 5 tons of water, which is forced through the pipes by a separate motor-driven centrifugal pump. The trucks replaced twelve teams and twenty-four men

Motor Age Wiring Diagram Chart No. 6

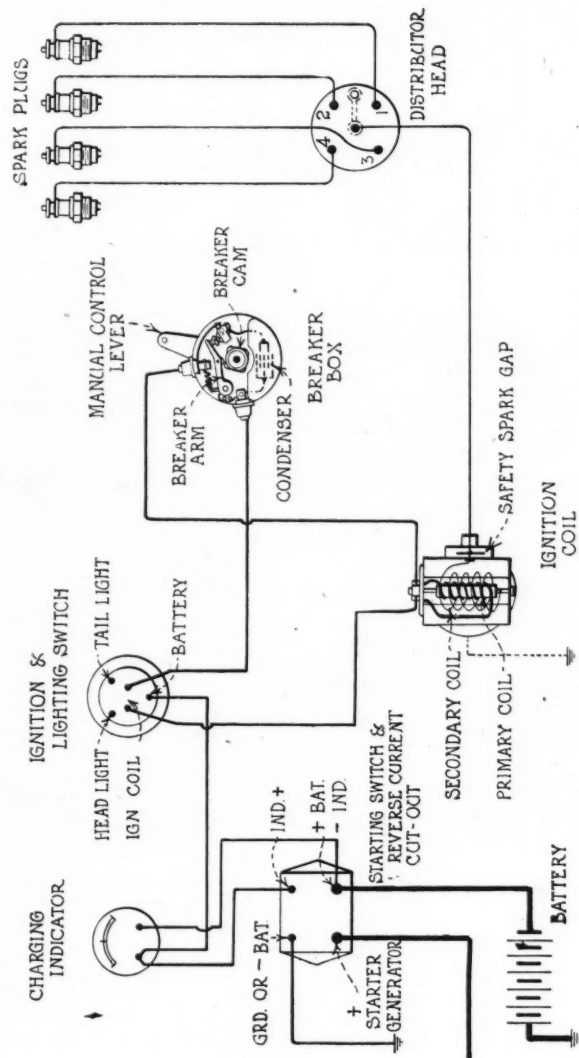
Dodge Brothers Models



North East motor-generator on 1916 Dodge Brothers car



Connections of North East cut-out, Dodge Brothers car



Delco model O ignition system on 1918 Dodge Brothers

Next Week—Cadillac

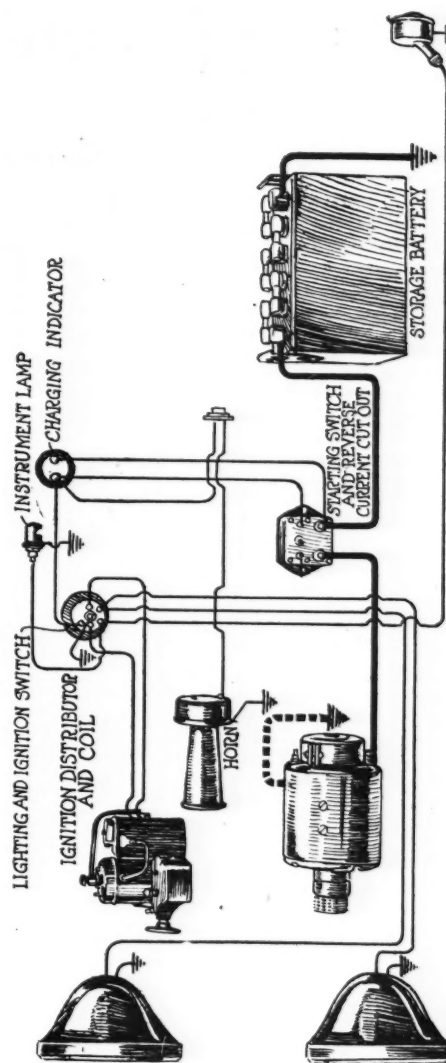
Alter—Nov. 14

Buick—Nov. 21

Chevrolet—Nov. 28

Hudson—Dec. 5

Overland—Nov. 7-14



Model G 12-volt North East system on 1917 Dodge Brothers

From the Four Winds

Glimpses at the World of Motordom

PHILADELPHIA Car Theft Toll Heavy—

More than 800 motor cars, valued at nearly \$500,000, have been stolen in Philadelphia since the first of the year. Less than 25 per cent of these losses have been recovered.

Detroit Acceptance Park Closed—Detroit Acceptance Park, where all aircraft constructed in Detroit were tested, has been closed by the government. Only one airplane now is stationed at the field and this probably will remain until such time as the park is abolished.

Club to Teach Car Owners—The Birmingham Automobile Club and the Rotary Club have combined with a membership of 500 motor car owners. The first official action regarding motor cars taken by the combination was to set up a training school with mechanics in charge to teach car owners how to make necessary repairs.

Claims Tire Service Record—W. A. Judd, Cropsey, Ill., believes that he can claim the record for passenger car tires. The tires came with the car which he purchased in June, 1916. They are 34 by 4, of white rubber. One ran 8043 miles without either puncture or removal. It was refilled with air twice, caused from a broken valve stem. Another of the same set is still in service with a mileage of 8108 to its credit.

Trucks Save Time for Farmer—A. D. Pete-fish, Sherman, Ill., breeder of hogs, utilizes an International truck to move his stock, crated, to the express office in Springfield, 6 miles distant. He makes the run with a full load in twenty-five minutes. Following a recent sale, he moved sixty head, all in separate crates, from his farm to Springfield in 4 hr. The movement would have required two days with a team and wagon.

Detroit Club Plans Future Activities—The Detroit Automobile Club is planning activities for the post-war period. A vigorous campaign for a state-wide bond issue in Michigan, complete marking of the highways, prosecution of thieves and others matters vital to the motorist are in prospect, says Edward N. Hines, president. Mr. Hines is known as the man who developed Wayne county's concrete highway system. Other officers for 1919 are Thomas P. Henry, first vice-president; G. Edward Bleil, second vice-president; William G. Bryant, third vice-president; W. B. Bachman, secretary; J. Lee Barrett, treasurer, and Capt. W. S. Gilbreath, manager. Club committees in an-



MOTOR CAR STILL HELPING—Here are some of the boys leaving Camp Dix in a car after being demobilized—proving the passenger car is a very necessary aid in time of peace or war

nual reports showed that nineteen thieves had been convicted through the club's efforts, 584 miles of highways were marked, 16 miles of the Dixie highway in Monroe county completed, this road being necessary for movement of army trucks, and 12,600 tourists visited the club's touring bureau in the year just ended.

Washington Registers 124,447 Motors—Bringing the total to 124,447 for the current year, 2811 licenses for motor vehicles issued in October are the figures compiled by the secretary of Washington state. The license fees amounted to \$860,418.

O'Neil Reports on Lincoln Highway Work—No further new road work will be undertaken by Pennsylvania for the present, Commissioner O'Neil has announced, because of the lateness of the season. In a report submitted to Lieutenant-Governor McClain, counsel for the Lincoln highway, he states that 248 miles

of highway have been resurfaced, 22½ miles have been reconstructed and seven concrete bridges have been built, the total spent on the highway this year amounting to \$747,505.

Federation Wants Parcel Post Routes—The parcel post routes committee of the Ohio Good Roads Federation will co-operate with the Postoffice Department in developing new parcels post routes throughout the Buckeye state.

Columbus Club Elects Officers—M. J. Hanly has been elected president of the Capitol Motor Club of Columbus, Ohio, to succeed S. P. Kinnard. Charles Tuller was elected vice-president; R. C. Bates, secretary, and Gardner Sterns, treasurer.

Iowa Plans New Trail—The chamber of commerce of Charles City, Iowa, through its good roads bureau has been working for several weeks on a highway to Marshalltown and Des Moines. Work is to start at once on the marking of the trail. The name is Tractor City trail, in honor of Charles City, a pioneer tractor city. All towns along the trail have agreed to bear their share of the expense. Butler county will gravel its section of the road next spring. All other counties through which the new trail extends have agreed to keep the roads in good condition. The marking of the route will be in black and white. The route extends through Greene, Allison, Parkersburg, Grundy Center, Beaman, Conrad to Marshalltown, and from there on to Newton, where it will join the River-to-River route to Des Moines. At Charles City the route joins the Red Ball route to the Twin Cities. There are tentative plans at Charles City to extend the route north through Rochester, Minn., to the Twin Cities in the spring. The Tractor City trail is a north and south trail, which will compete with the Jefferson highway to the west for north and south traffic.

COMING MOTOR EVENTS

MEETINGS

Jan. 12-14—Society of Automotive Engineers, New York.

Feb. 25-28—American Road Builders' Association, New York.

SHOWS

Boston—March.
Bridgeport—Not decided.
Buffalo—March 3-8.
Brooklyn, N. Y.—Trucks, April 1-5; Cars, March 22-29.
Chicago—Probably March.
Cleveland—Late March or Early April.
Des Moines—Feb. 17-22.
Detroit—January.
Great Falls, Mont.—March.
Harrisburg—Not decided.
Hartford—Not decided.

Indianapolis—Dec. 2-7.
Louisville—Feb. 15-22.
Kansas City—Tractor, Feb. 10-15.
Kansas City—Not decided.
Milwaukee—Jan. or Feb.
Minneapolis—Feb. 15-22.
Montreal—April 5-12.
Newark, N. J.—Feb. 15-22.
New York—Probably March.
Philadelphia—March.
Pittsburgh—March.
St. Louis—Feb. 24-28.
San Francisco—March 1-10.
Syracuse—March.
South Bethlehem—Trucks, Feb. 24-27; Cars, Feb. 17-22.
Trenton, N. J.—3d week of March.
Utica—March.
Wichita, Kan.—Tractor, Feb. 18-22.

Spring Service for A Nation.

VULCAN

The Replacement Spring



Sign and Display Rack FREE

The Display rack and Service Sign is Furnished Free with the first order, including appropriate advertising helps.

America's Motorists

have been educated by national advertising to look for VULCAN Service signs when in need of Spring Replacements.

Performance of VULCAN Springs on their cars has convinced them of the Superiority of VULCAN.

VULCAN Dealers

are profiting by the demand created through national advertising, combined with supreme quality of VULCAN Springs and convenience of VULCAN Service.

VULCAN Service

embraces the needs of both motorists and dealers, supporting each to the highest degree of efficiency. A constant stock of over 100,000 VULCAN Springs furnishes the source of supply. The individual supremacy of each spring, because of the "built in" quality, assures satisfaction to user and distributor.

Become a VULCAN Dealer and enjoy the benefits of a ready made market.

Write for particulars regarding VULCAN.

JENKINS VULCAN SPRING CO.

Richmond, Indiana

BRANCHES.

St. Louis, Mo.
Minneapolis, Minn.
Dallas, Texas.
Reading, Pa.
Sumter, S. C.
Atlanta, Ga.

1402 Chestnut St.
1024 Hennepin Ave.
209 S. Houston St.
538 Franklin St.
29 Caldwell St.
48 Auburn Ave.

JENKINS VULCAN SPRING CO. RICHMOND INDIANA

Strom

BEARINGS

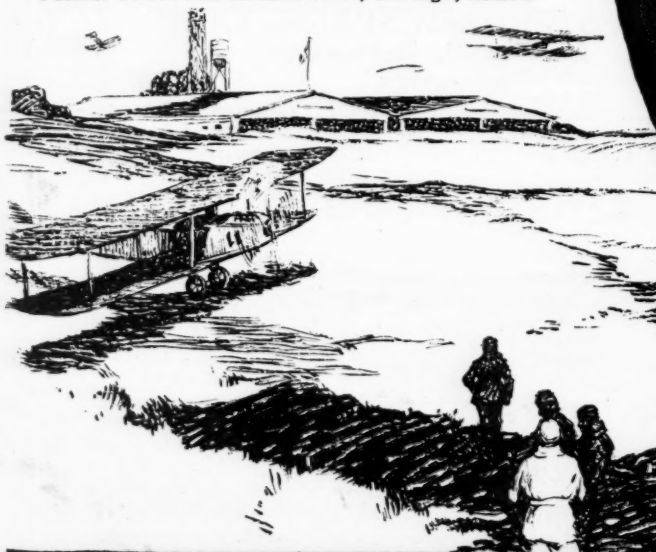
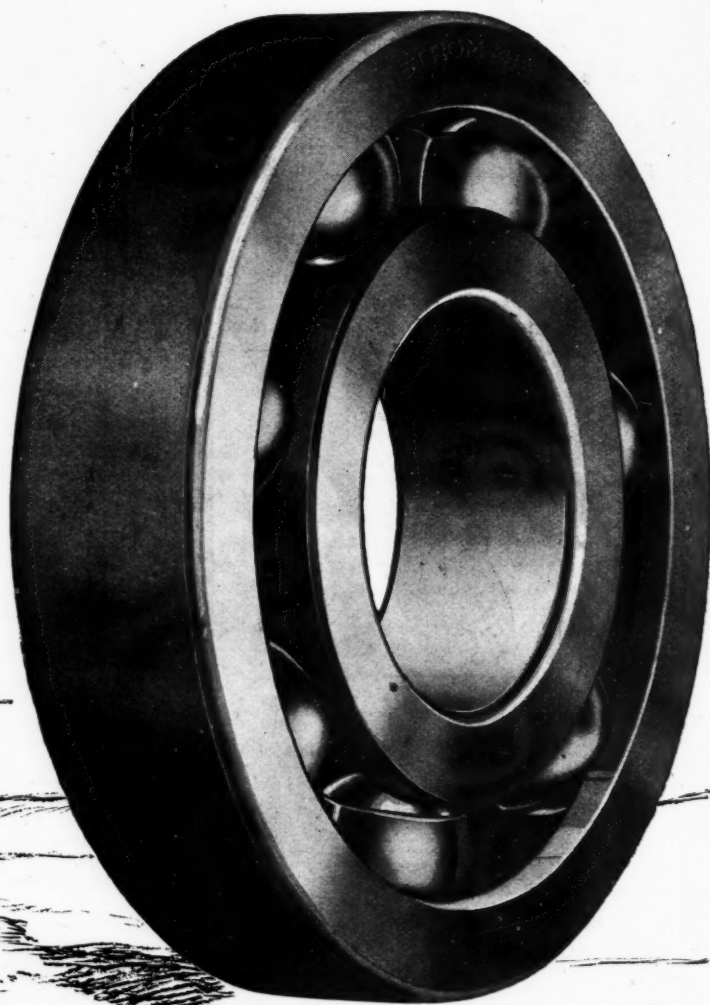
FORMERLY U.S. BALL BEARINGS

SPEED brought victory—up there a-top the clouds where man-birds rode the air and measured mettle in mortal combat. Strom Bearings, with their big balls and deep grooves without notches, gave the full measure of the motor's power to the drumming propellers. In aeroplanes, machine tools, tractors and tanks—wherever dependable bearing service must be had—Strom Bearings multiply power by practically destroying friction.

U. S. Ball Bearing Mfg. Co.

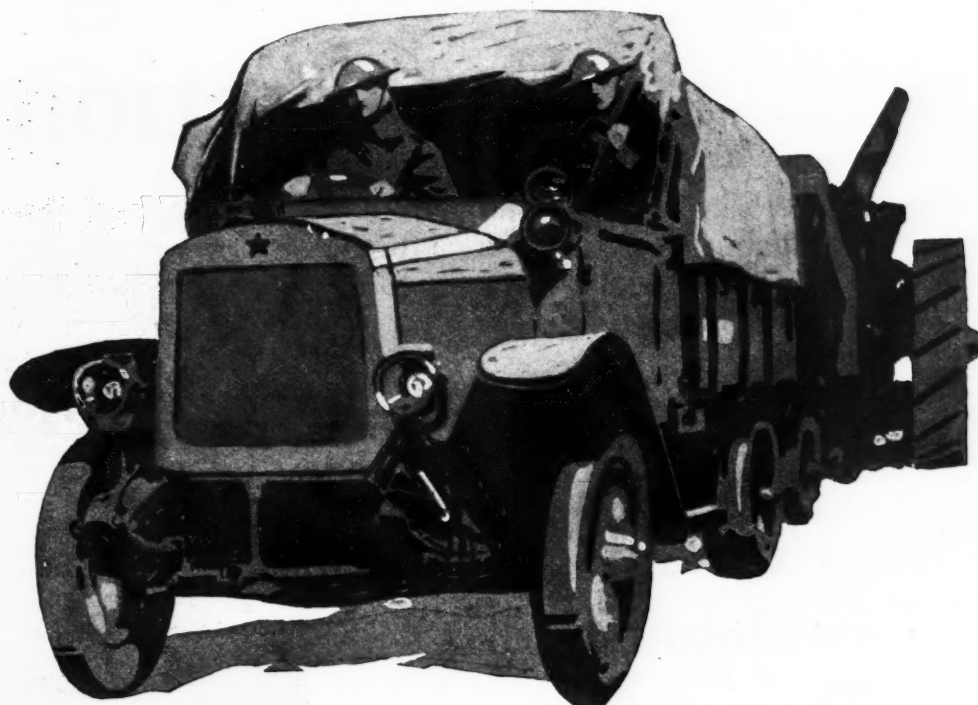
(Conrad Patent Licensee)

Palmer Street and Kolmar Ave., Chicago, Illinois



ATWATER KENT

SCIENTIFIC IGNITION



Bethlehem Motor Trucks Are Atwater Kent Equipped

The big, hot, unfailing spark at all motor speeds assures maximum power and dependability.

Dealers are building up a profitable business in replacing truck magnetos with Atwater Kent Systems. Types K-2 and H for trucks not electrically equipped. Type CC for trucks electrically equipped.

*Atwater Kent Scientific Ignition will replace any magneto
and give better ignition service*

ATWATER KENT MFG. WORKS *Philadelphia*

WRITE FOR LITERATURE TO 4934 STENTON AVENUE

Rayfield Resumes Production

Our war work is now almost finished. Shipments of Rayfield Carburetors are increasing daily. Soon we will be up to schedule on the world's most efficient carburetors for passenger car and trucks.

Warm up your motor quicker

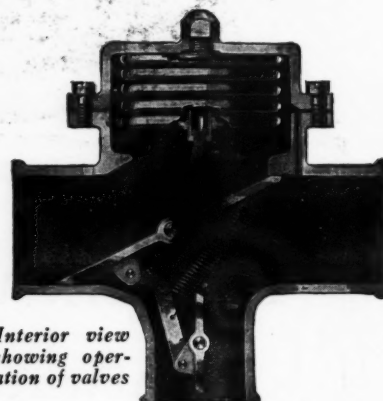
Rayfield Motor Thermostat

Every motorist has experienced the difficulties of winter driving. When the motor is cold it will continue to miss. It will not accelerate. It has no power.

The installation of a Rayfield Motor Thermostat causes the motor to heat up quickly, and maintains a constant efficient temperature at all times. If the car is stopped, the engine remains warm for a greater length of time. This greatly facilitates starting and gives a quicker acting motor. In fact, it assures the same motor efficiency in winter as in summer.

The Rayfield Motor Thermostat is different in operation and construction from any other device of its kind. When water in motor is cold the main valve is closed, which prevents circulation through motor block. This permits motor temperature to rise to the point of maximum efficiency within a very few minutes in the coldest weather.

In motors with pump circulation the pump pressure is relieved by by-passing the water from delivery end of pump through by-pass valve and into the radiator. Complete circulation of water through the radiator is thus maintained at all times. This overcomes, to a great extent, the com-



*Interior view
showing oper-
ation of valves*

mon difficulty of water in the radiator freezing before circulation begins.

When water in motor block reaches a temperature of 170 degrees, its action upon diaphragm of the Thermostat causes it to expand and gradually open the main valve. This action also slowly closes the valve of the by-pass connection. The diaphragm is sensitive to any variation of water temperature and will open or close main valve as required. In this manner a constant, efficient motor temperature is maintained.

For thermosyphon systems the price, including all fittings is \$15.00. For pump circulation systems the price, including all fittings, is \$17.50. Installation is simple. Your own garage, or dealer can handle it for you.

Sales and Service Stations Everywhere

Findeisen & Kropf Mfg. Co.
21st and Rockwell Streets, Chicago

Ready for a Big Business



PYRENE'S part in the war is finished. More than 1,000,000 Pyrenes have been in the Service. On motor cars, motor trucks, tanks, airplanes, patrol boats and wherever the use of gasoline engines demanded efficient fire protection, Pyrene was there to give it.

With peace, the demand for Pyrene will be even greater. The war has given Pyrene great prestige—proven that it is indispensable automotive equipment. Thousands of returning troops now know Pyrene and its fire-fighting qualities.

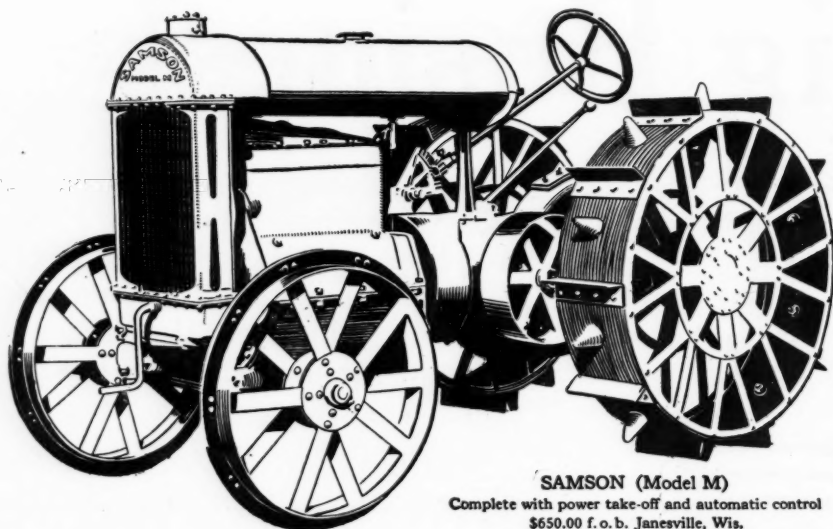
Pyrene production shortly will be, we believe, on a full peace basis. Millions of Pyrene Extinguishers will be sold in the next few years. Each sale represents a good profit. Pyrene sales and advertising effort will be behind you to create the demands. A liberal policy towards distributors is in force.

Jobbers and dealers whose stocks have been diminished during the last months of the war will have their orders filled in order of receipt.

PYRENE MANUFACTURING CO.
52 Vanderbilt Avenue New York

ATLANTA: - 259 Peachtree Street
CHICAGO: 327 W. Jackson Boulevard
CLEVELAND: 1104 Prospect Avenue
KANSAS CITY: 1712 Grand Avenue
SAN FRANCISCO: 527 Mission Street





SAMSON (Model M)
Complete with power take-off and automatic control
\$650.00 f. o. b. Janesville, Wis.

SAMSON TRACTOR \$650

THE above announcement, which appeared in a recent issue of this paper, resulted in receiving thousands of inquiries. Everyone of these we propose to answer in detail. The enormous amount of work involved in classifying these inquiries will, of necessity, delay our replies. On the opposite page, you will find a copy of our letter and the form, which we are asking you to fill out and return to us.

We also invite those who have not answered our first advertisement to fill in blank on opposite page and receive further information.

SAMSON TRACTOR COMPANY,

Janesville, Wisconsin

SAMSON TRACTOR COMPANY
JANESVILLE, WISCONSIN

Dear Sir:

In response to your valued inquiry, we are enclosing a blank form which we will ask you to fill out and return promptly to us. Our object in obtaining this information is to determine whether or not the Samson (Model M) is suited to your needs and to what extent your particular locality lends itself to the use of tractors of the Wheel Type.

To be perfectly frank and candid with you, and to have you know what we are driving at, we beg to offer the following in explanation:

WE DON'T WANT you to buy a Two-Three Plow Tractor if it would be to your advantage to buy a Three-Four Plow Tractor. If your farm is better adapted by reason of acreage, crop rotation or soil conditions, to the Three-Four Plow type, we want you to have it, because it will be a more economical investment and will produce 25 per cent. better results with the same amount of labor.

Note: In this connection we wish to advise that we have designed and are testing out a Three-Four Plow Tractor which we expect to offer to the public within the next few months. This will be known as Samson (Model A) and the price will be in the neighborhood of \$900.

WE DON'T WANT you to make an investment in Samson (Model M) Tractor if the Samson (Model M) Tractor is not the best type for your particular purpose.

WE DON'T WANT you to make an investment in Samson (Model M) Tractor if the Samson (Model M) Tractor is not the best type for your particular purpose.

WE DON'T talk draw bar pull or attempt to confuse you with horsepower rating. Draw bar pull you can reduce expenses and make your burden lighter.

WE DO WANT you in the Samson family—a satisfied and continuous customer for SAMSON LABOR SAVING AND MONEY SAVING DEVICES.

WE DO WANT you to investigate and (regardless of any high powered, land breaking tractors that you may buy or own) purchase a Samson (Model D) light, high frame, direct drive tractor, for which we are now taking orders. Price \$450.

It will be to your interest to own the Samson (Model D) tractor, for which we are now taking orders. Price \$450.

BECAUSE this tractor will handle every horse drawn farm tool which you are now using;

BECAUSE we will be prepared to furnish the more important types of farm tools, made especially to work with Samson (Model D), at just one-half the price which you will have to pay for these farm tools when you come to replace them;

BECAUSE the Samson (Model D), in connection with a ground-breaking tractor of any type and a Samson light truck, will eliminate every horse on your farm.

METHOD OF ALLOTING SAMSON (Model M) TRACTORS

The demand for Samson Tractors from all parts of the world is enormous. Our production for the next four months will not exceed 10,000 tractors. If applications and contracts were filled in the order in which they are received, our entire production might be absorbed by two or three States. For the purpose of obtaining a wide distribution, giving the public an opportunity of investigating the product and watching the performance, we are allotting a certain number to each County, with a proper Township distribution, locating the samples where most convenient for the greatest number.

Your application, accompanied by your order or otherwise, will receive our best consideration.

Very truly yours,

SAMSON TRACTOR CO.

Information necessary so as to enable us to advise the purchaser of the proper Tractor he should buy

Name.....
Post Office.....
Township..... County..... State.....
Number of acres in farm..... Acres in corn.....
Number of acres improved..... Acres in cotton.....
Level or rolling surface..... Acres in small grain.....
Character of soil..... Acres in hay.....
Acres in pasture.....

How many horses do you employ to handle your farm work?.....

Do You own a tractor?..... If so, what make.....

Mail this blank to SAMSON TRACTOR COMPANY, Janesville, Wis.

Traffic Truck

4,000 LBS. CAPACITY

Brief Specifications—Weight 3,300 lbs.; 4-cylinder, valve-in-head; 40 h. p. motor; Covert transmission; Borg & Beck disc clutch; Kingston magneto with impulse starter; 4 piece cast shell; cellular type radiator; drop forged front axle with roller bearings; Russell rear axle, internal gear, roller bearings; Semi-elliptic front and rear springs; 6-inch U-channel frame; Standard Fisk Tires; 133-inch wheelbase; 122-inch length of frame behind driver's seat; oil cup lubricating system; chassis painted, striped and varnished; driver's seat and cushion regular equipment.

\$1395

The Lowest Priced
4,000 lb. Capacity
Truck in the World

Traffic

Built for Business and Delivering

The Traffic is delivering better business to dealers everywhere because it answers four hauling problems out of every five.

The Traffic is the lowest priced 4,000 lb. capacity truck in the world, constructed of standardized units of known value.

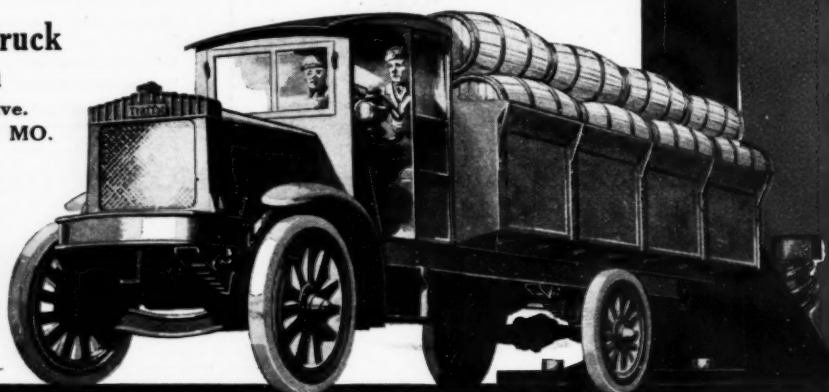
Because of quantity production the Traffic price is hundreds of dollars lower than is quoted for trucks of the same capacity. It is entirely free from competition.

Chassis \$1395 f. o. b. St. Louis

Traffic Motor Truck Corporation

3807-19 Laclede Ave.
ST. LOUIS, MO.

The Traffic is delivering big business to dealers. Why not to you? We want a dealer in every city, town and village in this country. Wire to-day and learn if your territory is open.



HARNESSING the power of America for the vigorous prosecution of a Victorious War against the foes of Democracy has developed the greatest single force the world has ever known.

As small a part as the 100 per cent war production of our plants played in the vast program, it was one of the vital cogs in that Great Machine that has redeemed civilization.

American Hammered Piston Rings were chosen by Uncle Sam and our Allies for war motors. It was recognized that the exclusive American process of *Hammering in the quality* gave to the motor every atom of power that gasoline could generate, and assured the greatest possible degree of motor efficiency. Curtailed as our production for trade consumption has been, arrangements are rapidly being perfected to supply the demands of the manufacturer and the trade.



Correspondence Solicited

HAMMERED PISTON RING CO. OF AMERICA
NEWARK, N. J., U. S. A.



When Writing to Advertisers, Please Mention Motor Age

STANDARD PARTS

Ready Now!

No great change in our equipment line-up was caused by the work we were privileged to do for war purposes.

We are immediately returning to the work of taking care of our normal customers.

Inquiries already at hand are indicative of early activity all

along the line of Peace-time manufacturing.

We offer those who look to us for their requirements, extensive resources, large facilities, and valuable service due to our fortunate manufacturing position, our own connections and the number and geographical location of our factories.

Standard Parts for Motor Cars, Trucks, Tractors, Airplanes, Motorcycles and Other Vehicles

Axles
Axles (dead rear)
Axles, trailer
Bock Bearings
Hubs

Perfection Springs
(regular and thin leaf)
Perfection Heaters
Stanweld Rims
and Tubing

Other Stanweld Products

Rims—clinchers detachable and demountable for single and dual equipment.
Clincher Rims
Detachable Rims for Wire Wheels, special
Millimeter Rims, all types
Rim Tools
Flanges and Fittings Solid Tire
Demountable equipment

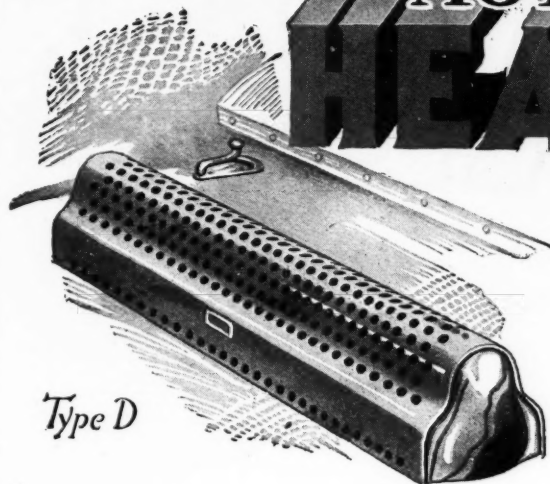
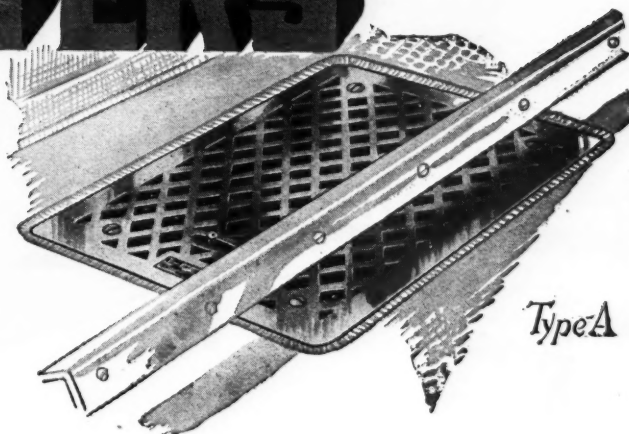
Tire Bases in Demountable and pressed on Channels
Brake Rod Assemblies, complete
Starting Cranks
Electric Welding of Parts
Exhaust Tubes
Bands S. A. E.
Formed Tubing
Forging for Convertible Trucks
Ignition Wiring Tubes
Lamp Brackets

Mast Sleeves
Oil Tubes
Radiator Rods
Starting Gear Rings and Boxes
Straight Steel Tubing
Steering Gear Tubing
Tail Pipes
Torsion Tubes
Truss Rods
Tubing (straight and formed)

We also manufacture parts for Bicycles, Firearms, Carriages, Wagons and Special Purposes.

The Standard Parts Company, Executive Offices, Cleveland, Ohio

PERFECTION MOTOR-CAR HEATERS

*Type D**Type A*

96% of all makes of automobiles can now be equipped with Perfection Motor Car Heaters.

4% of all automobile owners cannot ride in comfort.

24 prominent manufacturers of automobiles now include Perfection Motor Car Heaters as standard equipment in one or more models.

100% satisfaction and service is obtainable from the Perfection Heater—it heats in two minutes after starting car, no odor, no noise, heat volume under ready control.

*Ask your dealer or write to us to learn
whether you can have a 96 per cent car*

The Standard Parts Company, Perfection Heater Div'n, Cleveland, Ohio



During the past two years, we have been building for the United States and our Allies, a product which required the utmost care in manufacture. Quite modestly, we may say that our work gained for us an international reputation for accuracy and precision. We formulated a splendid organization of highly-trained operatives, selected for intelligence, skill and responsibility. The experience gained during our war service has been invaluable and we re-enter peaceful pursuits with the knowledge that Gray & Davis systems are built by men and machines which have no equal in this industry.

GRAY & DAVIS, INC.
Boston, Mass.

VASTLY
GRAY &

PEACE



During the war, our engineers looked toward Peace and with it a demand for **BETTER** starting-lighting. These men devoted **ALL** their activities, **ALL** their time, **ALL** their energy to the design of a new Gray & Davis system which would eclipse anything on the market. Their efforts were crowned with success in the new 2-unit, round type system. The system; the organization; the engineers are available to motor car manufacturers who seek 100 per cent plus in starting-lighting equipment—a remarkable combination of war-time efficiency devoted to production of a peaceful product.

GRAY & DAVIS, INC.
Boston, Mass.

IMPROVED DAVIS



For FORDSON TRACTORS
Champion Fordson Tractor
Plugs. Price \$1.00

For Fordson Tractors and Ford Cars

READE the advice contained in the Ford Motor Company's instruction book placed in every Ford car:

"There is nothing to be gained by experimenting with different makes of plugs. The make of plugs with which Ford Engines are equipped when they leave the factory are best adapted to the requirements of the motor."

Consider that Champion "X" is regular factory equipment on Ford cars, and has been continuously since 1911—

Consider that the Champion Fordson tractor plug is also regular factory equipment in Fordson tractors and that Fordson builders recommend *this* plug to Fordson owners—

Could there be stronger proof to guide you in the choice of spark plugs to handle and recommend to owners of Ford cars and Fordson tractors?

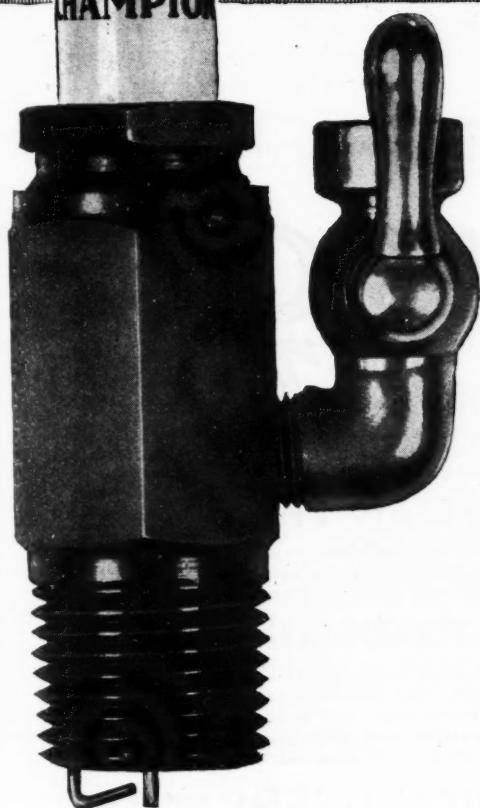
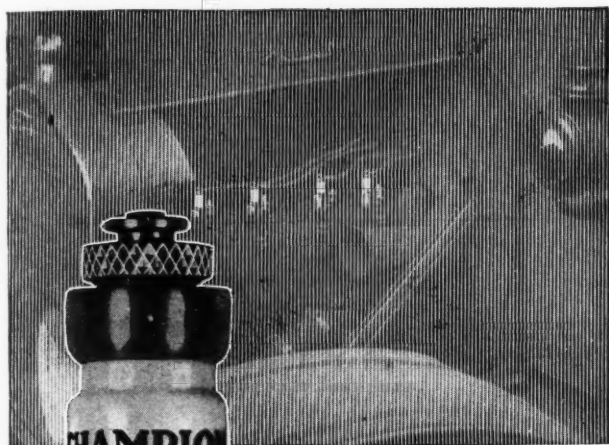


For FORD CARS
Champion X
Price 90c

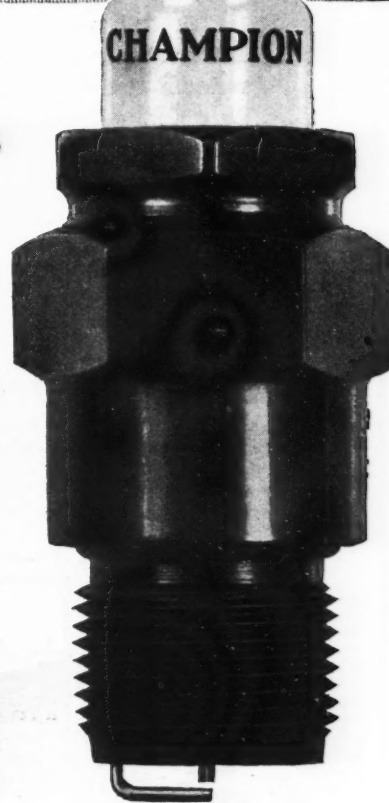
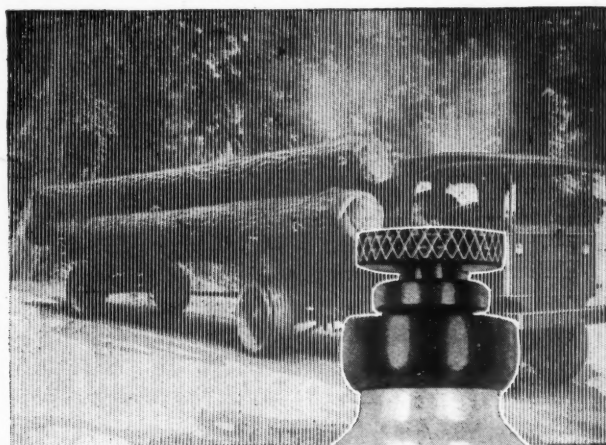
Champion Spark Plug Co., Toledo, Ohio
Champion Spark Plug Co., of Canada, Limited, Windsor, Ontario

When Writing to Advertisers, Please Mention Motor Age

pion Dependable Spark Plugs



PRIMING PLUGS
Price \$1.50 Each



"HEAVY STONE"
Price \$1.25

Two More Big Champion Sellers

THE public demand is great for Champion Priming Plugs at this time of the year—dealers should order at once.

They sure-start cold motors because the gasoline trickles down—right where the spark jumps.

They are necessary in cold weather for the hundreds of thousands of cars without priming cups and are infinitely better for those with them, because priming cups let the gas in too far from the spark plug.

The Champion "Heavy Stone" plug has been proven by far superior for the type of motors for which it is designed. It is recommended for large powerful passenger cars and for heavy service trucks and tractors.

The dealer handling the complete Champion Spark Plug line has a plug especially designed for every type of engine.

Champion Spark Plug Co., Toledo, Ohio
Champion Spark Plug Co., of Canada, Limited, Windsor, Ontario



Push and Pull-Every Wheel a Worker

THAT is the way motor trucks must drive if they are to put the full power of the motor to work in carrying the load. On the Oshkosh 4-Wheel-Drive the motor pulls with the front wheels—pushes with the rear wheels—all four wheels are load moving wheels where there's any traction at all and either pair locks automatically when traction ceases so that the full motive power is transmitted to the wheels that grip instead of being wasted in spinning.

OSHKOSH TWO

Oshkosh Drive System

Drive to the four wheels is through a Brown Lipe 4 speed forward transmission to an Oshkosh sub-transmission (our own make) from which two interchangeable propeller shafts of equal length, one to front axle and one to rear axle carry the power to the wheels.

Front and rear axle drive members are of the standard full floating type.

Our own patented steering construction in the front axle gives easy steering with full power development.

Heavy Duty Truck Motor


Motor is Herschall-Spillman— $3\frac{1}{4} \times 5$ —heavy duty type for hard work. Equipped with Stewart Vacuum Feed and hung in three point suspension.

Pneumatic Tires

A big feature is Goodyear-Cord pneumatic truck tires, 36x6. You can drive an Oshkosh Truck fully a third faster than any solid tired truck with far less vibration, and that means a big saving in repair bills and delivery time.

TRUCK USERS —buy a power-on-all-4 truck, that gives you the lowest operating cost coupled with constant use in all kinds of weather—under all road conditions.





**Next
Spring**

The Easy Job Better-The Impossible Well

PRACTICALLY 100% transmission of motor power to the wheels is the reason for the performance value of the "Oshkosh 4-Wheel-Drive." There is a firm driving grip on the road at four points. Driving on only two wheels wastes approximately 20% of the motive power in road slippage on good roads. The Oshkosh 4-Wheel-Drive does the easy job better—on less gasoline, less oil, with less wear on tires, with greater safety because skidding is reduced to a minimum, and at lower upkeep. It does the impossible job *well* because it still has two working wheels when ordinary trucks stall.

Four Wheel Drive Ton Capacity

*A Complete Truck for User and Driver—
Electric Light and Starter—All
Weather Cab, Standard*

An All Weather Worker

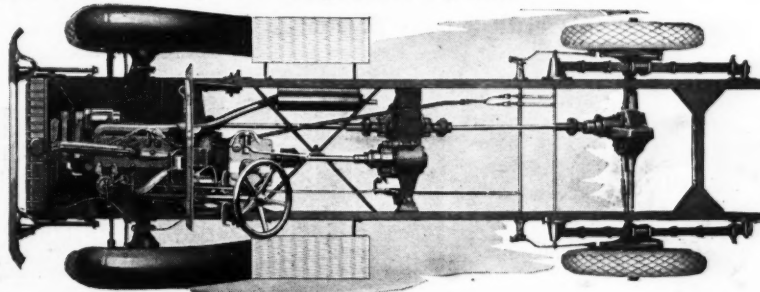
Oshkosh gives plus value by adding to the highest quality in specifications the most complete equipment ever offered in a motor truck.

Electric lighting and starting, not only a protection against broken arms and other accidents but a big factor in more miles per gallon. Speedometer, motor driven warning signal, extra rim for spare tire, all-weather cab, complete tool equipment, with heavy duty jack and tire pump.

TRUCK DEALERS —Here is a brand new seller—a two-ton truck with all that means in gasoline economy of four wheel drive with all that means in excess power. A few desirable territories are open for quick action.

Oshkosh Motor Truck Mfg. Co.
Oshkosh, Wisconsin

Drive your Oshkosh Truck this winter. Plow through the deep snow without stalling—without spinning your wheels—then in the spring do the same work in mud. Load your truck to capacity and if you occasionally have more than a two-ton load, hook on a trailer to carry the excess—the Oshkosh will pull it. This is the kind of truck quality that counts—the quality of unfailing service anywhere.



**The choice
of 51 leading engineers**

Premier *MOON* *DENBY* *KISSEL* *HUDSON SUPER SIX* *PILOT* *Autocar* *Russel* *Lippard-Stewart* *WHITE* *GRAMM BERNSTEIN* *LEXINGTON* *SHEDDEN* *MARMON* *KING "8"* *TORBENSEN AXLE* *COLUMBIA AXLE* *REPUBLIC* *BETHLEHEM MOTOR TRUCKS* *APPERSON* *EMPIRE* *PIERCE-ARROW* *Auburn* *National* *Trundaar Tractor*

When you recommend Thermoid Brake Lining to your customers your recommendation is backed by the endorsement of 51 of the leading automobile engineers of the country. They have selected Thermoid for their cars only after the most exacting tests.

1—Over 40% more material and 60% more labor are used in Thermoid than in any woven brake lining. This gives longer wear.

2—Thermoid Brake Lining is Grapnalized, an exclusive process which resists moisture, oil and gasoline.

3—Thermoid is hydraulic compressed. It wears down slowly and can be used until it is cardboard thin.

Thermoid is recommended by these engineers for use on new cars because it gives dependable service and helps to build good will for their products.

It should be recommended by you for relining jobs because it will help to build good will for you.

Write today for information.

Every foot of Thermoid is protected by **Our Guarantee: Thermoid will make good—or WE WILL.**

Thermoid Rubber Company

Factory and Main Offices:
Trenton, N. J.

Factory Branches:
New York, Chicago, San Francisco, Detroit, Los Angeles, Philadelphia, Pittsburgh, Boston, London, Paris, Turin.

Canadian Distributors:
The Canadian Fairbanks-Morse Company, Limited, Montreal
Branches in all principal Canadian Cities

Where Thermoid is used

Notice the varied types of cars in which Thermoid is used. High priced heavy cars where service—not cost—is the prime consideration. Lower priced popular cars whose makers are willing to pay a little extra for brake lining that gives the maximum safety. It is also used on the leading axles. The engineers designing these axles are particularly well qualified to weigh the merits of brake lining.

Why Thermoid was selected

There are three reasons why Thermoid has been selected by this critical body of competent judges.

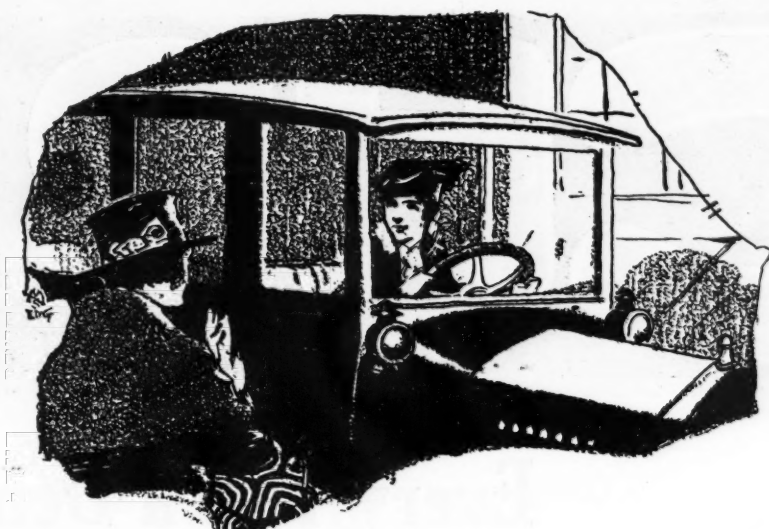
Thermoid
Brake Inspection Chart

At speed of	A car should stop in
10 miles per hr.	9.2 ft.
15 " " "	20.8 "
20 " " "	37 "
25 " " "	58 "
30 " " "	83.3 "
35 " " "	104 "
40 " " "	148 "
50 " " "	231 "

Will your car do this?



Makers of "Thermoid Crolide Compound Casings" and "Thermoid—Hardy Universal Joints"



“Hubby Bought a Disco Starter”

Thousands of hubbies are buying Disco Starting and Lighting Systems—it seems that never before has there been such a universal demand for greater safety, convenience and economy.

And that's just what the Disco results in.

It insures safety for every member of the family. It multiplies the usefulness of Ford cars, for the Disco equipped car can be run by anybody without the possibility of “stalling.”

Starters aren't usually thought of as a means to greater economy. But they most certainly are. If it were possible to determine the exact amount of gasoline that is wasted by idling the motor, it would be shown that by stopping such waste a Disco Starter would in that way alone go far in paying for itself. It's so easy to start your Ford engine when equipped with a Disco—simply press the button, and because of the built-in strength and ruggedness, it is always dependable.

Each Disco System is equipped with the famous Detroit Storage Battery. Thousands upon thousands of motor car owners think of their Detroit Batteries as positively the best made. The thick plate construction gives long life, and it has more than enough power to spin your motor even in the coldest weather.

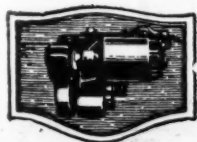
Dealers, Join Us

We are daily adding to our well established organization dealers for both the Disco Starter and the Detroit Storage Battery. Our proposition is broad and liberal, these are dependable products and back of them is one of the soundest concerns in the industry.

If you sell Ford cars your position is ideal to sell Disco Starters for Ford cars. Why not write for details—and remember, we are making immediate shipments (a decided advantage at this time).

Disco

ELECTRIC MANUFACTURING CO., DETROIT
Dependable Products
 Disco Starter
 Detroit Storage Battery

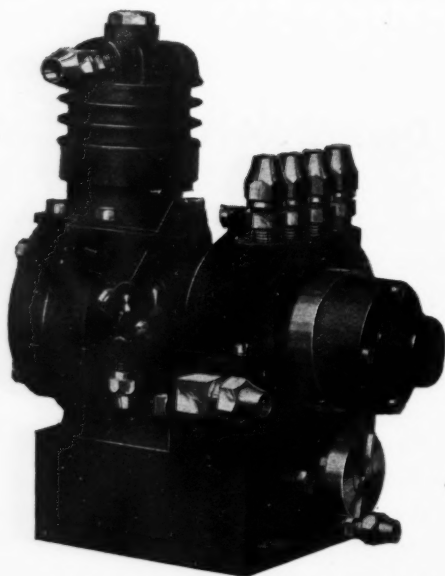


When Writing to Advertisers, Please Mention Motor Age

CHRIS



Makes a Plaything
of the
Biggest Motor



The CHRISTENSEN Starter Unit.
It is about as big as a magneto.

Every Test a Demonstration

In every test in which the CHRISTENSEN Starter has participated, it has come off the field with high honors.

Not only have tractor tests proven the remarkable consistency and efficiency of the CHRISTENSEN Starter. The most exacting and careful government tests were unable to bring out a single objectionable feature.

Upon both army and navy airplanes—where a piece of faulty mechanism or an untried principle would mean putting lives in jeopardy—the CHRISTENSEN demonstrated emphatically every claim made for it.

The simple fact that the brute motors of practically every big city fire department truck in the country are started on the CHRISTENSEN principle is a further testimony to its positive reliability in emergency service.

It is only reasonable to assume that a tractor starter of such qualifications is capable of meeting satisfactorily every requirement in the tractor starting field.

Every tractor manufacturer, tractor dealer, and tractor user interested in tractor development will appreciate the importance of the following test record made recently on the Lauson Tractor at Salina:

Motor—Lauson Beaver, 15-25 H.P., 4"
Bore, 6" Stroke.
Ignition, Dixie Magneto.
Compression, 54 lbs. per square inch.
Temperature, 75° Fahrenheit.

STARTER DETAILS

Weight of Unit.....	28	pounds
Weight of Tank.....	12	pounds
Weight of Fittings.....	10½	pounds
Total Weight	50½	pounds

Test No. 1

To show how many starts can be made without recharging the tank:

Initial pressure	250 pounds
Number starts made.....	16
Pressure still in tank.....	100 pounds
Pressure for each start.....	9 pounds
Time required for each start.....	1.5 seconds

Test No. 2

Pump up from 100 to 250 pounds, 4 minutes, 37 seconds.

The CHRISTENSEN
819 First National Bank Bldg.

CHRISTENSEN STARTERS ARE PROTECTED

TRACTOR

TENSEN

★ Carburetion Principle

of Superior Performance

Test No. 3

Time to restore pressure used for one start, from 240 to 250 pounds, 30 seconds.

SPECIAL TEST NO. 1

While motor was running on kerosene, it was stopped by cutting off the ignition. It was then started on kerosene, with gasoline in the starter carburetor.

Pressure in tank, 250 pounds; pressure after start, 240 pounds; pressure consumed, 10 pounds; time required to start, 1.5 seconds.

SPECIAL TEST NO. 2

While motor was running on kerosene, it was stopped by overloading with a brake. The starter carburetor was filled with kerosene and the motor started on kerosene.

Pressure in tank, 240 pounds; pressure after start, 230 pounds; pressure consumed, 10 pounds; time required to start, 4 seconds.

SPECIAL TEST NO. 3

While motor was running on kerosene, it was stopped by shutting off the fuel supply, causing entire absence of fuel within carburetor, manifolds, or engine cylinders. Kerosene supply was turned on and with kerosene also in starter carburetor, motor was started.

Pressure in tank, 230 pounds; pressure after start, 220 pounds; pressure consumed, 10 pounds; time required to start, 5 seconds.

SPECIAL TEST NO. 4

Motor running on kerosene was stopped by cutting off ignition. Pet cocks were opened and motor started with kerosene in motor and starter carburetor.

Pressure in tank, 220 pounds; pressure after start, 205 pounds; pressure consumed, 15 pounds; time required to start, 5 seconds.

SPECIAL TEST NO. 5

Hot water was left out of motor and cold city water circulated through motor till it was as cold as the water. Motor started with kerosene in engine carburetor, gasoline in starter carburetor.

Pressure in tank, 205 pounds; pressure after start, 190 pounds; pressure consumed, 15 pounds; time required to start, 6 seconds.

SPECIAL TEST NO. 6

Motor carburetor supplied with gasoline, the tractor put in low gear. The start was perfect, the tractor immediately moved forward. Same test made with tractor in high gear.

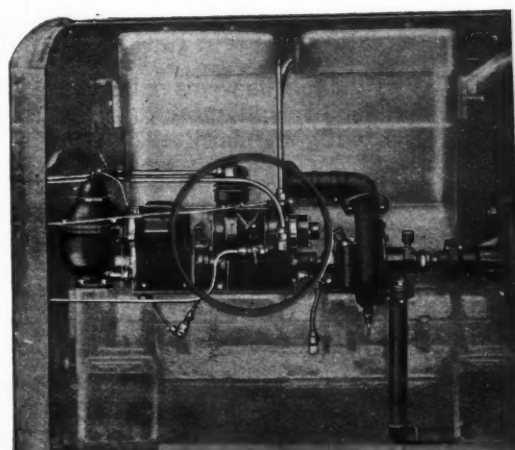
TRACTOR DEALERS: Insist that the tractor you handle be CHRISTENSEN equipped in order to cut down selling resistance and increase your tractor sales.

TRACTOR USERS: Refuse to accept a new tractor unless it is self-starter equipped. Protect your time, protect yourself and your workmen against accident. See to it that the tractor you buy is **completely** equipped. Any tractor without a starter, you know, is only a one-half efficiency farm tool.

If desirous of installing a CHRISTENSEN Starter on your old tractor, send us its make and model for complete descriptive literature.



Makes a Plaything
of the
Biggest Motor



CHRISTENSEN Starter Installed
on the Lauson Tractor

ENGINEERING CO.

MILWAUKEE, WISCONSIN

BY U. S. AND FOREIGN PATENTS

STARTER



Performance

The performance capacity we build into J & D Tires is more than sufficient to insure every tire's making the rated 5000-mile mileage and over.

To obtain such results it is important to resist the temptation to save time and money, and to increase production by adopting short cut methods that detract from quality; it is necessary to insist on the careful inspection of every tire in all stages of construction; it is above all essential to give untiring attention to the minutest details of manufacture.

By doing this we have been enabled to produce a tire of unusual capability and, more than that, a tire in which quality has been virtually standardized.

The J & D Tire is tough, strong, resilient, with a tread that wears slowly and evenly, and a fabric that resists blowouts till the last possible mile has been squeezed out of the carcass.

*If you are interested in J & D Tires
write for our sales proposition.*

J & D TIRE COMPANY, Charlotte, North Carolina
NEW YORK OFFICE, 1834 BROADWAY

BETTER
MADE
FOR
BETTER
TRADE

J&D TIRES

THE MORE
THAN
5000
MILE
TIRE

LET This Quality Oil Help Build Your Sales

Good oil often accounts for all the difference between an engine that is alive and full of pep and one that is sluggish, dead and wasteful of oil and fuel. In other words, it accounts for the difference between a pleased and a dissatisfied customer.

A proven Quality Oil guards against sluggishness and power loss, against worn parts and loose bearings. It stalls off repairs and replacements—a consideration more important today than ever before.

Therefore, as a careful dealer you should always recommend

CREW LEVICK

Perfection Motor Oil

Backed by a half-century's reputation, used extensively in Pennsylvania, where it is pumped and refined by the Crew Levick Company's own works, this Quality Product is available now to all who realize that efficient operation and long-time service demand superior oil. You can get it for your customers.

Crew Levick Perfection Motor Oil is refined exclusively from Pennsylvania Crude—the highest priced crude today, and admittedly the best base for motor oil. Leave ordinary oil to the other fellow; pick a Quality Brand for yours. Sell genuine Crew Levick Perfection in sealed containers, or if you prefer, in half-barrels or barrels. You will save your customers trouble and expense, and make your reputation secure.

Write for our proposition

CREW LEVICK COMPANY

(Subsidiary Cities Service Co.)

117 NO. BROAD ST., PHILADELPHIA

Branches: New York, Boston, Baltimore, Chicago, Syracuse, San Francisco

When Writing to Advertisers, Please Mention Motor Age



Tillotson

CARBURETOR

Tillotson—

the name of the carburetor you had learned
to recognize as the leader before the war!

Tillotson—

the name of the institution that threw its re-
sources into the work of helping to win the
war!

Tillotson—

the name of the carburetor that will represent
the highest efficiency and dependability after
the war!

The Tillotson Manufacturing Company, Toledo, Ohio



NOW ON PEACE PRICE BASIS

\$100 Reduction on Both Models

\$1195 for Touring Car
\$1695 for Sedan

The new prices, f. o. b., factory

The stimulus of a lower price will make many new friends for the Allen.

More people will discover what Allen owners all know: that this car renders a surpassingly satisfactory service at a low average cost of mileage and upkeep.

Allen owners give unstinted praise to the comfort features of this car and to its splendid ability on stiff grades and hard going.

But most of all these friends of the Allen are insistent on the dependability of this trim, soundly-built motor car.

It is the goodness built deep and sure that brings unfailing excellence of performance.

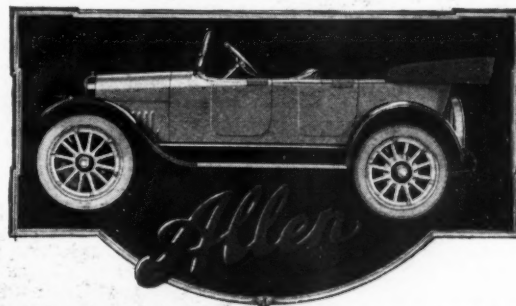
The belief of Allen owners in Allen value is this company's most cherished asset.

Old friends are held firmly because of this car's superiority.

New friends come to the Allen on account of this same vital quality.

Immediate deliveries on both models are being made, since production is again increasing. Dealers are being added rapidly where territories are still open.

The Allen Motor Co.
 FOSTORIA, OHIO



Getting Down to Brass Tacks

Bill: How's a fellow to know which car is the best to buy, anyhow? I'm so mixed up over all these specifications that I don't know where I'm at.

Tom: Why not go at it as if you were building your own car? Put down a list of your own requirements and then see what make of car comes nearest.

Tom's advice is a good hint to any car buyer, try it yourself some time.

First—what's our source of power? At once the names of one or two engines come to mind. Write them down.

Next comes the rest of the power plant—transmission and rear axle.

And a strong, reliable support for the whole unit, front and rear axles and good springs.

Then we must have absolutely dependable brakes—can't take any chances on being able to stop when it's necessary. And the steering mechanism is equally important.



Do you realize that you've now put down all the parts that really make the car, because they

define *power, strength, operation, upkeep cost and human safety.* And do you realize that axle power, axle strength, axle durability is involved in each of the vital necessities?

Human safety, upkeep cost, power transmission, carrying the load, steering the load, and stopping the load—all depend in a large measure on the axles.

Surely you would not build or buy a car without knowing more about the axles whose name and reputation are as old, as widely known and as firmly established as the automobile itself.

Ask for, and read carefully these two books, H-13a "The Anatomy of Automobile Axles," and H-13b "117 Users of Timken-Detroit Axles." Sent free, postpaid on request to

 THE TIMKEN-DETROIT AXLE COMPANY 
Detroit, Michigan

Oldest and largest builders of front and rear axles for
both motor cars and trucks

TIMKEN-DETROIT AXLES





More and More DrideK Every Month

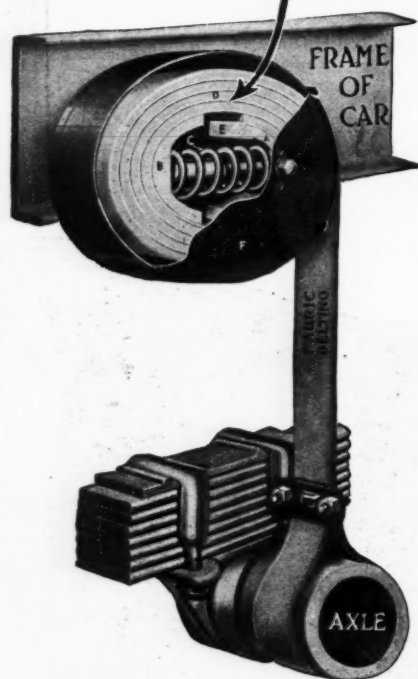
The most remarkable material yet
produced for Automobile Tops,
Curtains and Upholstery.

Light, pliable and waterproof.

*Send to Dept. C for samples
and price list*

L. J. MUTTY COMPANY
BOSTON, MASS., U. S. A.





Save on Tires, Springs and Car

Buy Snubbers and reduce the wear and tear caused by excessive throw of springs.

Used all over the World wherever there are motor cars.

Send for Literature and Name of Nearest Dealer

THE harder the Bull pulls, the tighter the rope coils around the tree to hold him. The harder the Springs try to rebound, and throw you from the seat, the tighter the layers of the Snubber coil to prevent it.

GABRIEL MFG. COMPANY
1415 E. 40th Street, Cleveland, Ohio

GABRIEL SNUBBERS

When Writing to Advertisers, Please Mention Motor Age

Why Shiver?



You Can Drive Your Ford in Perfect Comfort in the Coldest Weather

The Victor Heater supplies all the warmth you can possibly need for any kind of wintry weather. It gives as much or as little as the occasion demands. You can regulate it to suit yourself, by the simple turn of a lever.

The Victor Heater costs only five dollars, ready to install and use. You can attach it yourself in twenty minutes, without difficulty. It makes your Ford available for use 365 days in the year. Your dealer sells it.

VICTOR FRESH AIR HEATER FOR FORDS

FOREIGN & DOMESTIC AUTO SUPPLY CO.
1743 Broadway, New York U. S. A.

View from right door of Ford Tonneau, showing Victor Heater in place, flush with the floor boards

\$5

DEALERS, MAIL THIS

Foreign & Domestic Auto Supply Co.

1743 Broadway, New York.

Tell me about Victor discounts and sales helps.

Dealer's Name.....

Street Address.....

City or Town.....State.....

My Jobber is.....



Tires that'll save you money

WE mean just what we say when we tell you that Marathon hand-made tires will actually save you money. We know that your first experience with a Marathon tire will very probably cause you to switch to using nothing but Marathons. It's been the experience of hundreds of our customers.

That's why you'll find our dealers speaking so highly of these tires. They know what Marathons will do. They know that they're made entirely by hand from the finest materials we can buy.

And it's due to this same high quality, built into every Marathon tire, that we are able to offer you the broad guarantee we make.

Make up your mind to profit during the coming year thru the savings that Marathon can bring you.

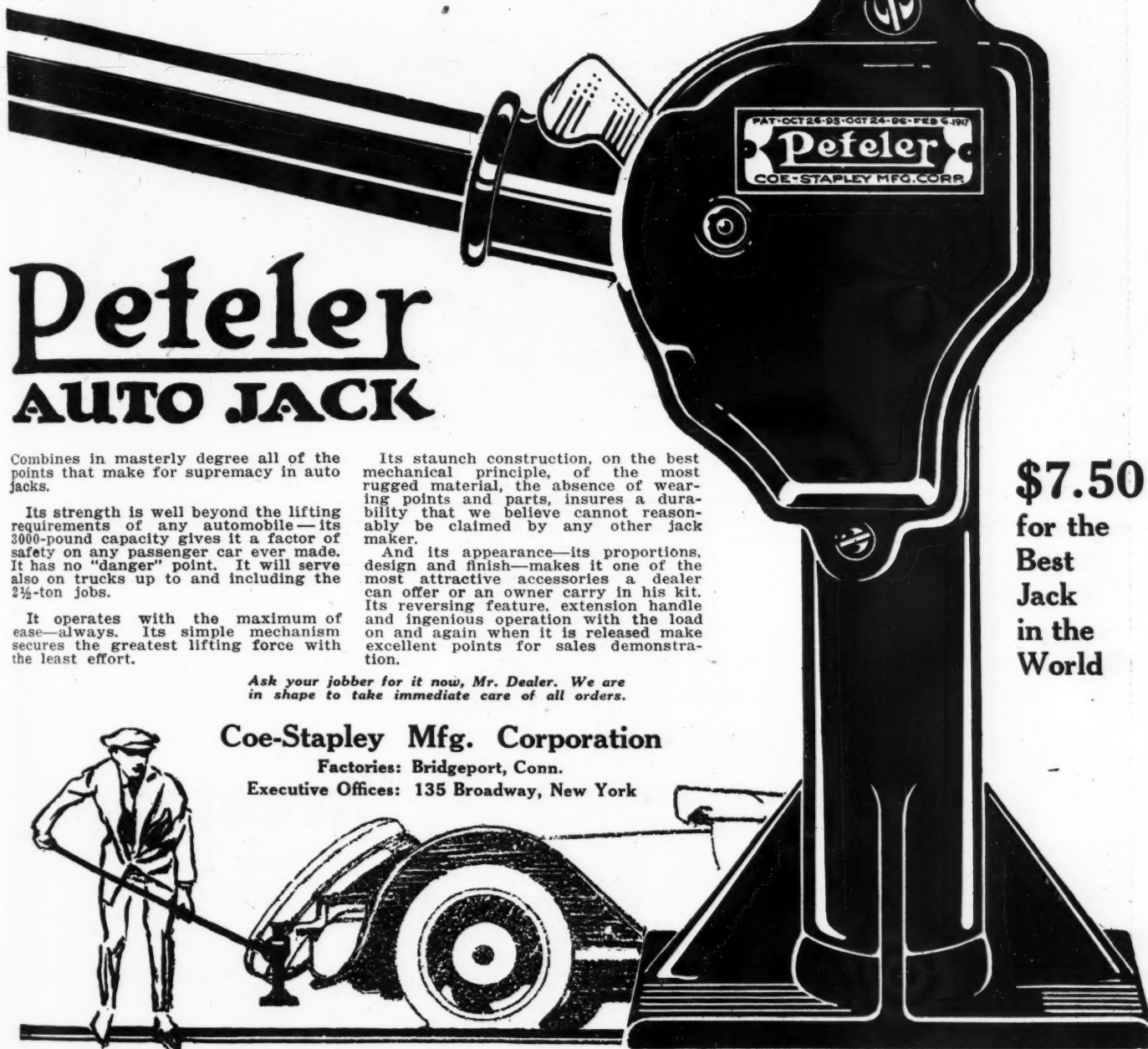


The Marathon Tire & Rubber Company
Cuyahoga Falls, Ohio

Canadian Factory, St. Catharines, Ontario

Quality Dominates

Strength, Ease of Operation, Durability and Appearance are the Quality Points in a Jack



Peteler AUTO JACK

Combines in masterly degree all of the points that make for supremacy in auto jacks.

Its strength is well beyond the lifting requirements of any automobile—its 3000-pound capacity gives it a factor of safety on any passenger car ever made. It has no "danger" point. It will serve also on trucks up to and including the 2½-ton jobs.

It operates with the maximum of ease—always. Its simple mechanism secures the greatest lifting force with the least effort.

Its staunch construction, on the best mechanical principle, of the most rugged material, the absence of wearing points and parts, insures a durability that we believe cannot reasonably be claimed by any other jack maker.

And its appearance—its proportions, design and finish—makes it one of the most attractive accessories a dealer can offer or an owner carry in his kit. Its reversing feature, extension handle and ingenious operation with the load on and again when it is released make excellent points for sales demonstration.

Ask your jobber for it now, Mr. Dealer. We are in shape to take immediate care of all orders.

Coe-Stapley Mfg. Corporation

Factories: Bridgeport, Conn.

Executive Offices: 135 Broadway, New York

\$7.50
for the
Best
Jack
in the
World

COE-STAPLEY

Half The Truck Tonnage Of America Is Carried On Firestone Tires



FIRESTONE built the first truck tires and has held leadership in this field ever since. The result is that half the truck tonnage of the country is now carried on

Firestone Truck Tires

The Firestone Giant Truck Tire shown here gives traction that puts trucks through snow-drifts, mud-holes and all the worst road conditions winter brings.

There are many other types and sizes of Truck Tires in the complete Firestone line, including the Giant Pneumatic Cord. Consult a Firestone man. He has every type to offer.

FIRESTONE TIRE & RUBBER CO.
FIRESTONE PARK AKRON, OHIO
Branches and Dealers Everywhere

JAXON RIMS



-at the center of the Motor Car and WHEEL INDUSTRY

THE location of the Jaxon Steel Products Company's plant is of great importance to the automobile manufacturer at all times, but especially so during this reconstruction period.

We can facilitate shipments to the wheelmaker and the automobile manufacturer with the least amount of time and expense.

This map answers the question.

Our policy is: Service in Quality; Service in Delivery; Service in Trouble; Service to Manufacturers, Dealers and Owners. Service all ways.

Jaxon Steel Products Co.
Jackson, Michigan

FWD TRUCKS



Power Front and Rear

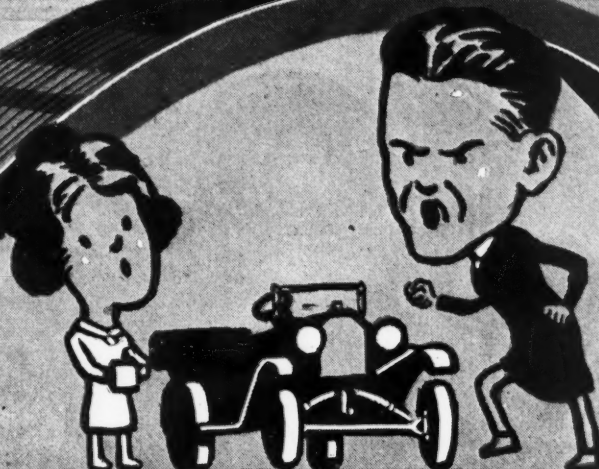
The manager of a Cuban sugar mill writes: "With the F-W-D and trailers I have hauled in one trip over 15 tons of sugar from plantation to mill—and this over the worst possible sort of roads."

It is the correct application of power, the push and pull principle, which has made a success of the F-W-D truck wherever it has been used—from the snow-covered steppes of Russia to the barren nitrate fields of Chile.

Write for catalog and complete information.

FOUR WHEEL DRIVE AUTO CO.

Dept. L Clintonville, Wis.



Don't scold your FORD if it gets full of carbon

Make your pistons tight and stop the carbon jinx. Munger "Always Tight" Piston Rings FIT and hold compression so that you can adjust your carburetor ACCURATELY.

You get perfect combustion; that means NO CARBON. The "Always Tight" Expansion Joint makes these rings PERMANENTLY gas-tight by compensating for wear as it occurs.



Price, \$1.25 each for all sizes up to 3-3/4 inches in diameter.

The complete FORD Set consists of eight regular size "Always Tight" Rings for the lower grooves and four over-width "Always Tight" Rings for the top grooves. With each complete FORD Set a Munger Regrooving Tool and a Munger Ring Insertion Tool are included FREE.

Get them from your supply dealer or garage man.

SPLITDORF ELECTRICAL CO.,

Sumter Division: 1466 Michigan Ave., Chicago

Newark, New Jersey

SERVICE STATIONS:

Atlanta,	10-12 E. Harris Street	Minneapolis,	816 Hennepin Avenue
Boston,	68 Brookline Avenue	Newark,	278 Halsey Street
Chicago,	2613 S. Michigan Avenue	New York,	7 W. 61st Street
Dallas,	402 S. Ervay Street	Philadelphia,	210 N. 13th Street
Detroit,	1295 Woodward Avenue	Pittsburgh,	5943 Ellsworth Avenue
Kansas City,	1827 Grand Avenue	San Francisco,	1022 Geary Street
Los Angeles,	1215 S. Hope Street	Seattle,	1628 Broadway
		Toronto,	469 Yonge Street

Guarantee—If these rings do not give entire satisfaction, return them to the dealer and get your money back.

Use

MUNGER

"Always Tight" Piston Rings

When Writing to Advertisers, Please Mention Motor Age

Join



When Distress Calls the Red Cross Answers "HERE!"

NOW the Red Cross calls! The annual Christmas Roll Call of members will echo throughout the land the week of December 16th to 23rd.

Membership in the Red Cross now is more than duty—it is an honored privilege, and an evidence of loyalty. When that Roll is called, your conscience, your sense of right and justice, your love of country and your devotion to the highest ideals of unselfish service all suggest that you answer "HERE!"

All you need is a heart and a dollar
These entitle you to membership for one year.

When you wear your button, signifying that you are a member, you will not be asked to join again this year—it means that you have answered the Roll Call.

Join—be a Christmas member—but just join once.

Our soldiers and sailors look to the Red Cross for comforts. They have never been disappointed.

The Red Cross looks to you for the moral support of your membership. Answer "HERE!" when the Roll is called.

Join the Red Cross

Contributed through
Division of Advertising



United States Gov't Comm.
on Public Information

This space contributed for the Winning of the War by

MOTOR AGE



Wear Your Button



Fly Your Flag

The Advertisement We Did Not Use —and Why



For Hands That Rocked The Cradles

MOTHERS of the boys at the fighting front are giving more than their sons—they are giving *themselves*, their time, ability, and labor to the at-home-work necessary to win the war.

For their Red Cross and numerous other activities a

time-saving, energy-conserving car, such as Lexington, is of inestimable value to their personal efficiency, and, in the aggregate, to their country.

Essentially a service car, it also affords maximum comfort, convenience, and refinement—it is a sound investment.

The value of its exclusive Moore Multiple Exhaust System (which increases power and makes a substantial saving in fuel) is emphasized by the present-day economy spirit.

Write us for complete information on all Lexington models.

Five-passenger Tourabout, \$1685; Five-passenger Touring Car, with two auxiliary seats, \$1785; Five-passenger Convertible Sedan, with two auxiliary seats, \$1985; Three-passenger Coupelet, \$2450; Four-passenger Sedanette, \$2550; Four-passenger Coupe, \$2650; Five-passenger Salon Sedan, with two auxiliary seats, \$2750; Five-passenger Limousine-Brougham, \$3250.

All prices f. o. b. factory and subject to change without notice.



Lexington Motor Company

Connersville, Ind., U. S. A.

A VERY natural thing happened when the public learned there was a shortage of passenger cars. Not knowing when they could again purchase a new car, thousands sought to protect themselves.

Many even, who in other times would have been content with a car of lesser quality, were eager for a car of the highest quality, one that would insure them the best of service over the longest period of time.

The logical result was a tremendously in-

creased demand for Lexington cars that came as a climax to our sales increase of 1000% in three years.

Because of the ten large factories, specializing in automobile parts that are affiliated with and that contribute to Lexington, we were hoping to accommodate a limited number of the overwhelming requests without interfering with our Government work.

With this in view, we had prepared the above advertisement to direct the sale of

Lexington cars into channels where *most* needed by war-winning citizens.

Then Washington asked us to get upon a 100% war basis. In cheerfully complying with that request, we were *working for you*.

But our after-the-war plans are already well under way and we will be in an even better position to serve Lexington owners and Lexington dealers at a very early date.

Frank B. Ansted

President, Lexington Motor Company, Connersville, Ind.

Also on a War-Basis, Industries Associated with Lexington

Indiana Lamp Company, Central Manufacturing Company, Rex Manufacturing Company, Metal Auto Parts Company, Connersville Blower Company, Hoosier Castings Company, Tector-Hartley Motor Corporation, Ansted Engineering Company, Wainwright Engineering Company, Standard Parts Company—Ansted Plant

When Writing to Advertisers, Please Mention Motor Age

The New Construction

While there is a grim decision about war which enables us to meet a lot of difficulties through its necessities, there is an inspiration about the constructive requirements of peace which is altogether absent from the destructive obligations of war.

So we are securing a new inspiration, a new lift of the spirit as we gather forces for the development of peaceful gains.

In the automotive field we have learnt to see a bigger, more important place for this industry in the future. It has shown itself so necessary, so vital a part of civilized operations that we are conscious of a new outlook and faith in its development.

The problems of this development are with us and we need all the analytical

information we can secure to work them out.

AUTOMOTIVE INDUSTRIES expects to supply some of this in a special number to be issued on Jan. 16, 1919. This number will review and analyse the whole field of automotive endeavor.

It will detail the production and use of Automobiles, Farm Tractors, Trucks, Airplanes, Motorcycles and the principal metals, etc.

It will survey the domestic and foreign markets.

No such information has been gathered together for the automotive industry before. In this number the size, scope and possibilities of each branch of the automotive field will be laid before the manufacturer.

It will form a basis for his development plans.

Note its date and name

Jan. 16th, 1919—Statistical Number

**AUTOMOTIVE
INDUSTRIES**
AUTOMOBILE

Audel's Automobile Guide

With Questions and Answers

By Gideon Harris and Associates

A simple and concise manual relating to the parts, operation, care, management, road driving, carburetors, wiring, timing, ignition, motor troubles, lubrication, tires, etc., including chapters on the Storage Battery, Electric Vehicles, Motorcycles, overhauling the car, and an appendix on Self Starters and Lighting Systems.

Considerable space has been given to the principles of carburetors and ignition, realizing that they are of prime importance in the successful operations of a gas engine.

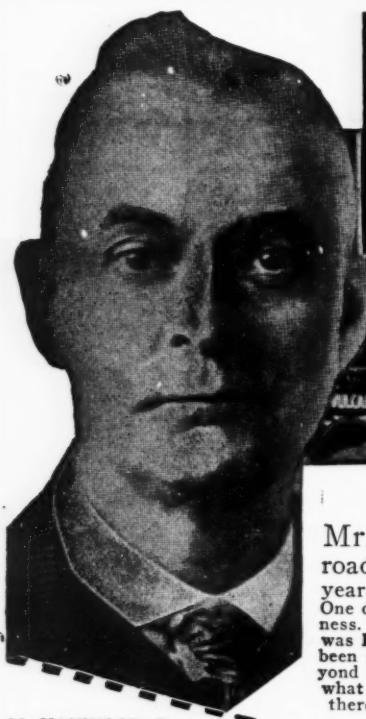
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| | 19. Ball and Roller Bearings | 30. Electric Lighting and Wiring |
| | 20. Lubricants and Lubrication | |

700 Pages, 5x8 Inches, 550 Figures, Flexible Leather, \$1.50

Sent Postpaid by

U. P. C. BOOK COMPANY, Inc., 243-249 West 39th Street, New York



This Is Richard A. Oldham

Mr. Oldham was telegraph operator for the Illinois Central Railroad for twenty years. He is fifty-eight years old. During all those twenty years, he drew the customary monthly salary of a telegraph operator—no more—no less. One day he read one of my advertisements and the possibilities of making money in the Auto Tire Repair Business. In a few weeks he had purchased and installed a Haywood outfit, and was doing business for himself. He was **His Own Boss**. A short time ago he wrote us that his income in four months was as much as it had been in Two and One-Half Years as Telegraph Operator. You men who have been left at home—who are beyond the draft age, can and must take up the burden left behind by others. Oldham is a living example of what can be done. I have 500 places to be filled now. 500 stations where tire repairing is neglected, because there is no one to do it.

I Must Have 500 Men to fill these places within the next sixty days

I have a big interesting book to send you—a book about tires—it explains this business—gives in side figures and profit. Gives actual proof of success—letters of others who are now operating Haywood Shops and making big money. What these men have done you can do. \$2,500 to \$4,000 a year is conservative. One machine will give you a start. You can see business all around you—everywhere there are automobiles there are tires that need repairing. You know that. All you do is open a shop—put out a Haywood sign, and auto owners will come to you and the service you bring them.

Sign the coupon and mail it today, or send a post card or letter.

HAYWOOD TIRE & EQUIPMENT CO.
M. HAYWOOD, President 501 Capitol Avenue, INDIANAPOLIS

M. HAYWOOD, Pres.
HAYWOOD TIRE & EQUIPMENT CO.

501 Capitol Avenue, Indianapolis, Ind.

Dear Sir: Please send me your book on Haywood Tire Repair Plants and full particulars on your National Tire Repair Service and details of your FREE school of tire repairing.

Name
Address
.....

When Writing to Advertisers, Please Mention Motor Age

TRIANGLE TRUCKS



**1½ and 2
Ton Models**

**Dealers,
write**

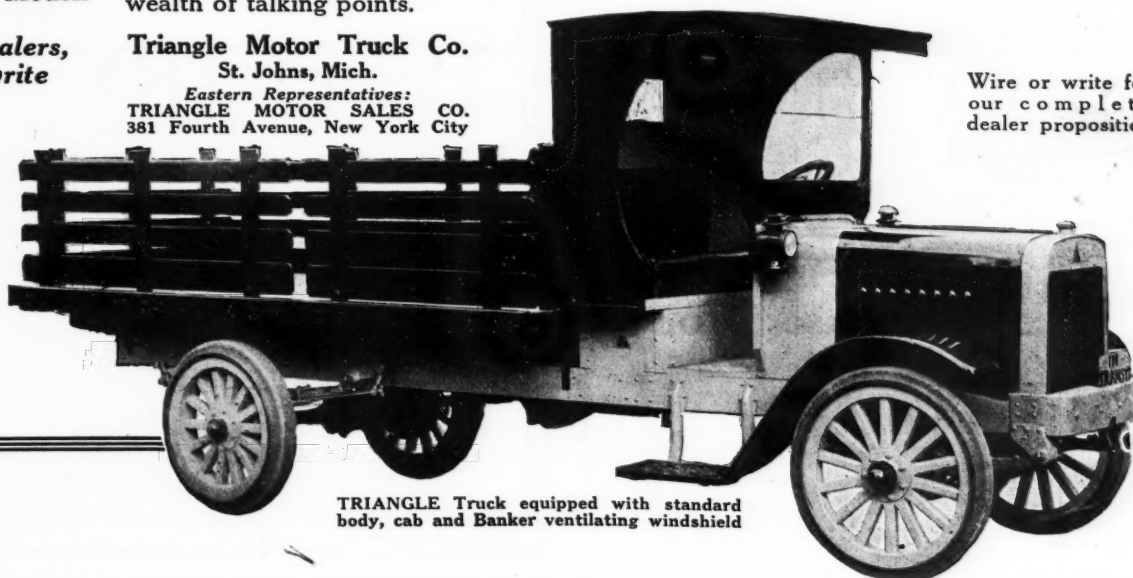
Now as never before motor trucks of 1½ and 2-ton capacity are in increasing demand. Never before was the field so great for a truck of Triangle calibre. As a progressive automotive dealer you owe it to your business success to at least investigate the exclusive merits of Triangle Trucks.

Sales resistance is practically eliminated by such names as: Waukesha, Eisemann, Stromberg, Celfor, Fuller, Universal, Hyatt, Bower, S.K.F., Perfex, M. & S., Torbensen, Gemmer and Banker. One of the biggest points in your favor that we know of is that every single unit of the Triangle is a vital selling point, thus giving the finished assembly an unlimited wealth of talking points.

Triangle Motor Truck Co.
St. Johns, Mich.

Eastern Representatives:
TRIANGLE MOTOR SALES CO.
381 Fourth Avenue, New York City

Wire or write for
our complete
dealer proposition



TRIANGLE Truck equipped with standard body, cab and Banker ventilating windshield

ROSE TIRE PUMP

will eventually
become a part
of your stock,
why not today?

OVER
1,000,000 in Use
OVER
3,000,000 Before
the Close of 1919

Write Dept. H for
Jobbers' proposition

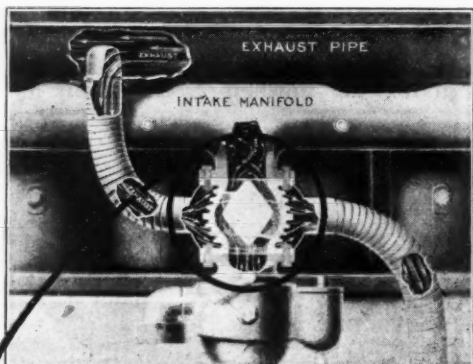
J. H. HANEY & CO.
HASTINGS, NEBRASKA
Manufacturer



Oh don't Mister!
Buy a Rose Pump!



DON'T RUIN YOUR MOTOR



Excellent Reasons for
Installing a
Lo-See Hot Spot
on Any Car or Truck.

It superheats all the fuel, entirely eliminating crankcase distillation. This means that no unburned fuel finds its way past the piston rings. Cylinder oil retains its lubricating power twice as long.

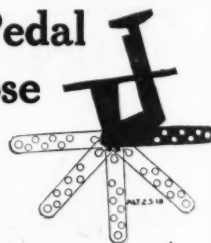
The Lo-See Hot Spot permits a leaner mixture, meaning more miles per gallon. It also makes a motor perform efficiently at any temperature. If not satisfactory after 30 days' trial your money will be refunded.

SPLENDID DEALER OPPORTUNITY

Dealers are ordering NOW in quantities. Orders shipped promptly. Installation simple. Descriptive folder on request.

Wee Specialty Co., not inc.,
1806 Michigan Avenue, CHICAGO

Here's the One Pedal for Every Purpose

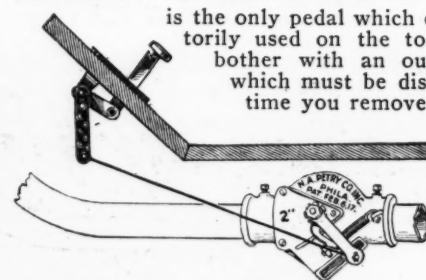


No other is like it in construction—no other can be like it in results. Whatever your requirement may be, the Petry Universal Pedal will meet that requirement in a way that could never be met before.

Made of high-grade steel, with special processed gun-barrel finish, the Petry Pedal is adjustable to pull or push for muffler cutouts of any style, kind or size; Accelerator, Exhaust Whistle or Horn—and Heater Valve.

The PETRY Universal Pedal

is the only pedal which can be satisfactorily used on the toe-board. Why bother with an out-of-date pedal which must be disconnected each time you remove the floorboard for lubrication or other purposes?



Write for circular today—and remember, we can make immediate deliveries if you order at once.

N. A. PETRY COMPANY, Inc.
1309 Race Street, Philadelphia

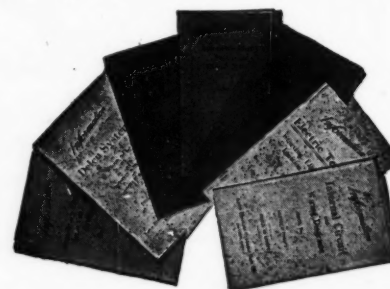
Distributors: Gray-Heath Co., 1440 Michigan Ave., Chicago, Ill.
Norman Cowan Company, 433-435 Rialto Bldg., San Francisco, Cal.

To Jobbers: Why tie up money in a large line of pedals when the Petry Universal Pedal answers every purpose?

How to Become an Expert on Electrical Equipment

You can get a thorough grasp on everything electric pertaining to Motor Cars, right up to the minute and be ready to take advantage of the wonderful possibilities they offer in the way of rapid advancement from the following information books by Harvey E. Phillips.

These books are used by Government Schools, Y. M. C. A. Schools and the trade in General.



- Book No. 1—Elementary Electricity, Motor Car Electric Systems and Delco Light.
- Book No. 2—Delco Systems, 1910 to 1915, Inclusive.
- Book No. 3—1916 Delco Systems.
- Book No. 4—19 Different Starting, Lighting or Ignition Systems.
- Book No. 5—All Principal Magnetos.
- Book No. 6—Electric Testing of Motor Car Electric Systems.
- Book No. 7—93, 1917 Internal Circuit and Wiring Diagrams of Motor Car Electric Systems.

Price of the set, prepaid, \$2.75

U. P. C. BOOK COMPANY, Inc.
243 West Thirty-ninth Street NEW YORK

BUILD BIGGER BUSINESS DURING THE RECONSTRUCTION PERIOD

From today on Ford cars will be in bigger demand than ever. Reconstruction will call for expansion of business. Ford delivery cars will have to be on a higher plane of efficiency. Ford passenger cars will be used more freely than during war times. All this means a bigger than ever demand for Dunn's Counterbalances for Fords.

Here Is a Vital Message for Every Dealer

When attached to a Ford Engine Dunn's Counterbalances produce a perfectly balanced crankshaft, which in turn means an enormous reduction in vibration. Vibration in the motor will reduce power and speed because vibration is nothing more nor less than motion or power. Reduce vibration and you automatically increase power and speed. The time of installation is less than an hour.

Any Ford engine can now have a perfectly balanced crankshaft similar to the most expensive cars.

DEALERS: We are receiving many orders direct that should be yours. The profits on these orders would be mighty pleasing to you. We can fill orders immediately. Wire or write today for our proposition. (Mail orders filled—where we are not represented—when accompanied by cash or specified C.O.D.)

DUNN COUNTERBALANCE CO.

Dept. 1

CLARINDA, IOWA

Western Representative: Dunn Counterbalance Sales Co.,
1220 San Pedro Street, Los Angeles, California.



PRICE
COMPLETE
ONLY

\$12

DUNN'S COUNTERBALANCES for FORDS

MORE POWER — MORE SPEED — MORE ECONOMY
" A PERFECTLY BALANCED CRANKSHAFT "

Install a Curtis Air Compressor

Display a CURTIS "FREE AIR" SIGN above your door—it inspires confidence and will help build your business. Motorists are looking for this familiar CURTIS slogan—because they know oil rots tires—and that a CURTIS Air Compressor furnishes AIR FREE FROM OIL, which means fewer blowouts, greater tire mileage and less repairs. The CURTIS is the ONLY Garage Air Compressor with the controlled splash oiling system that eliminates all danger of forcing oil into the air line.

CURTIS AIR FREE FROM OIL

Investigate the many exclusive features of CURTIS Garage Air Compressors. The line is complete—five sizes—stationary or portable. Just write your name and address on the margin of this advertisement—tear it out and send it to your jobber, or to us direct, for complete information and prices.

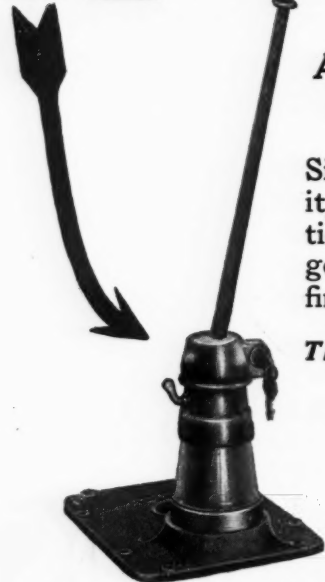
Curtis Pneumatic Machinery Co.
1527 Kienlen Ave., St. Louis, Mo.
Branch Office—530-H Hudson Terminal, New York City

The Curtis Sign

Illustrated above—is 10x14 inches—baked enamel on steel. Cannot be bought, but is furnished FREE with every CURTIS Garage Air Compressor—and cannot be had in any other way.

When Writing to Advertisers, Please Mention Motor Age

K & S



Auto Shifting Lever Lock

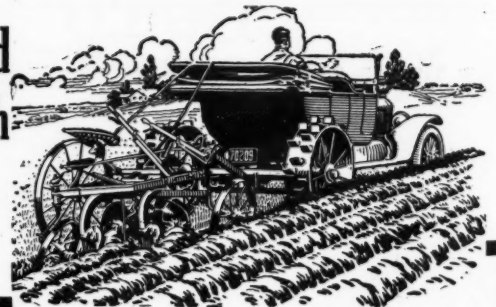
Simplicity, quality and sure action are mighty good features to find in a lock.

The K. & S. LOCK has been approved by experts

**DEALERS
WANTED**

K. & S. AUTO HEATER AND LOCK CO., Inc.
3357 South Michigan Avenue, CHICAGO, U. S. A.

**Plow and
Pull with
Your
FORD**



OR MOST OTHER CARS

Pullford \$155 F. O. B. Quincy, Ill.

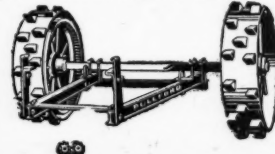
MAKES a practical tractor out of a Ford or most any other car. Easily attached to or removed from the car in thirty minutes. No holes to drill, no springs to remove. Practical, Durable, Reliable.

New FAN DEVICE Prevents Heating

Hundreds WORKING NOW for Satisfied and Enthusiastic Owners

Pulls plows, harrows, drills, mowers, binders, hay loaders, road graders, wagons, trucks, etc. Steel wheels with roller bearings and tires 10 inches wide, two pairs of hardened Vanadium steel pinions, one for plowing and one for hauling speed. A tractor with the reliability and durability of the Ford car. Prompt shipment. Write for catalog.

It was the Pullford attached to Ford cars pulling two 12-inch plows running on Kerosene, equipped with new fan device, that made a most successful demonstration at Fremont, Nebraska.



PULLFORD COMPANY
Box 301C Telephone No. 84
Walton Heights, Quincy, Ill.



CONSERVE Your Ford

The ripping, pulling, rack and strain of rough roads—sudden sways—those are the things that tear the life out of a Ford and run up repair bills. Stop them. Protect your car. Prolong its service existence. Cut down expense of repair—with

DUPLIX Cantilever Spring System for Fords

Most scientifically designed—strongest—most dependable system ever devised for Ford use. Not common shock absorber but full set of regular Cantilever Springs—as good as are used on best cars. Absorbs all shocks. Attaches to Ford springs—multiplies their endurance and resiliency. Increases comfort and safety. Insures longer and better service. Ready to install. Guaranteed against breakage and defects.

Price complete only \$18

30-DAY TRIAL Thousands in use. Write for descriptive matter or order on trial from this ad.

DUPLIX CANTILEVER SPRING COMPANY
178 North Dearborn Street
CHICAGO

At Our Risk— You Can Prove It

Don't waste good money on tire pumps that either break your back, or pump Rubber Rotting Oil particles or gasoline fumes into your tires.

Take No Chances

At our risk you can prove that the "Dead Easy" is quicker, safer, easier and cheaper than any other tire pump, either engine drive or hand power.

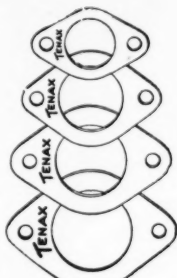


* Convenient to carry with any car, it is always ready for instant service. The gauge showing exact tire pressure, there is no guesswork—and it's "Dead Easy."

FREE TRIAL OFFER—Write today, NOW, for fifteen day—no money-in-advance—free trial offer.

GLOBE MANUFACTURING COMPANY
BATTLE CREEK, MICHIGAN, U. S. A.

COMPRESSED ASBESTOS SHEET PACKING GASKETS



Gaskets

A complete line of strictly high class Asbestos Products with attractive prices for automotive jobbers and dealers.

Tenax Compressed Asbestos Sheet Packing—In sheets 50"x50". Special size 50"x150". Thicknesses of 1/32" to 3/8", inclusive. Withstands temperature of 1200 degrees Fahr.

Tenax Gaskets—Insure tight joints. Extremely light weight. Won't blow, burn or squeeze out.



Vulcan Fan Belts

TENAX ASBESTOS PRODUCTS

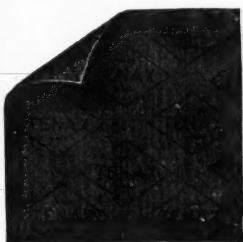


Brakebestos

Brakebestos—An asbestos wire inserted lining for truck and tractor friction brakes, clutches, etc. Guaranteed heat, oil and water proof.

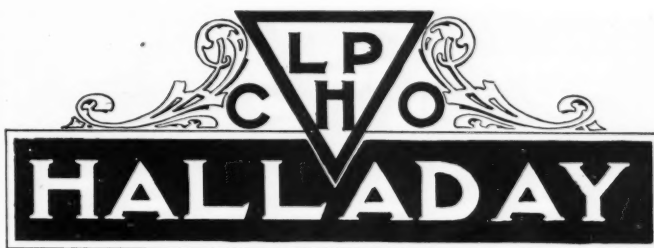
Vulcan Fan Belts—Non-slipping, long life type. Furnished either endless or detachable style.

Jobbers and Dealers—Write for attractive proposition.



Sheet Packing

ADVANCE PACKING & SUPPLY COMPANY
Tractor Dept. 13-15 N. Franklin St., CHICAGO, U. S. A.



AUTO ESSENTIALS

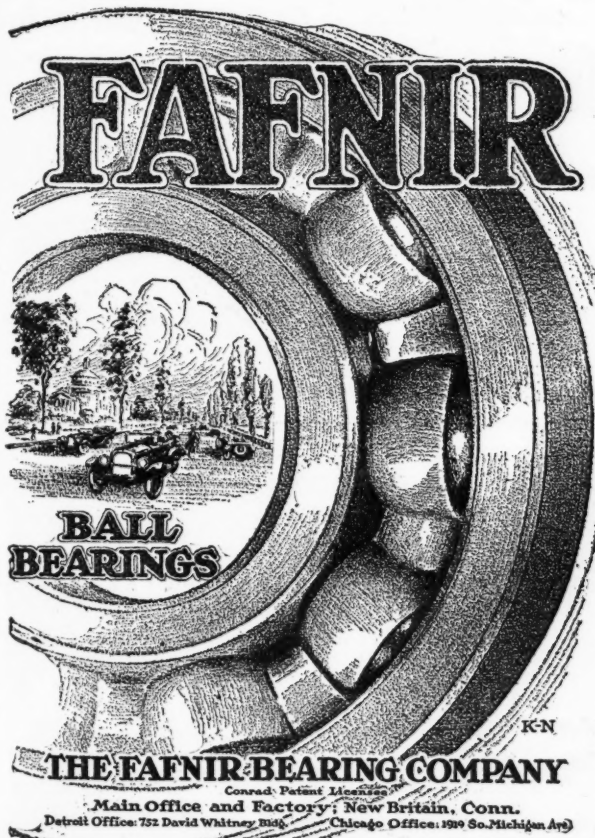
FRONT BUMPERS REAR For All Cars

Universally adaptable to all cars of Standard design and "tailor-made" to fit cars of special construction.

No matter what car you sell or use, the best bumper you can put on it is a HALLADAY.

SEE THE DEALER OR WRITE US

L. P. Halladay Company STREATOR, ILLINOIS



WHEREVER a real truck is demanded, the Oneida has earned the right of first consideration.

Designed by engineering skill second to none, powered to meet every emergency of load and road, it stands as a great achievement in the motor truck world. Dealers: Write or wire. Your territory may still be open. 1, 1½, 2, 3½ and 5 ton models. All worm drive.

PROMPT DELIVERIES!

Oneida Motor Truck Co. Dept. 422
Factories: Green Bay, Wis.

ONEIDA

MOTOR TRUCKS

Edward A. Cassidy Co.

A SELLING CORPORATION
Madison Avenue and Fortieth Street
New York City

CONAPHORE — KIMBALL AUTO JACK
G-P MUFFLER CUT-OUT — LONG HORN
ECCOLENE — RAJAH SPARK PLUGS

KISSEL TRUCKS



Incomparable engine ability, axles, springs, brakes and frame of the best material, and above all, unexcelled workmanship, characterize Kissel Trucks.

See your nearest Kissel Dealer today

Kissel Motor Car Company, Hartford, Wis., U. S. A.



Absolutely Accurate Crankshaft Machining

20 years' experience. New Machinery of the latest design
Highest quality work and prompt delivery guaranteed
Ample capacity for large orders

"MOLTRUP FOR QUALITY"

Moltrup Steel Products Company, Beaver Falls, Pa.

Acornette Pump Connection

THE Acornette is not just "another connection." It embodies a big improvement—the design of the barrel, which houses the rubber washer, absolutely prevents washer-buckling. Acornette is really air-tight. List price, 15c.

Dealers: Ask for our new 64-page catalog.

STEVENS & COMPANY
375 Broadway New York



STEVENS PRODUCTS



The Starter Battery That Is Sold on a
15-Months' Guaranteed Adjustment Plan

CALL AT ANY OF OUR
SERVICE STATIONS

U S Light & Heat Corp., Niagara Falls, N. Y.



"Built for
Your
Business"

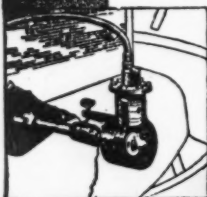
No three-quarter-ton truck' on the market can meet the Atlas standard—it is unquestionably alone in the field, 118-inch wheel-base; rear axle of full ton capacity; Atlas motor, 3 1/4 x 5 inches; increased piston displacement; over-sturdy dreadnaught type, armor clad radiator.

Thirty-three
Body Types

MARTIN TRUCK
AND BODY
CORPORATION,
York, Penna.



960,000 PROSPECTS
With Cars between \$800 and \$1300



Now ready for Briscoe, Dodge, Chandler, Hudson, Overland, Reo, Hupmobile-R and Studebaker cars. On and off in a jiffy without tools. Not a rubber diaphragm device. Write for details. Dealers, ask for discounts.

Price \$12

DETROIT ACCESSORIES CORPORATION
2021 Gratiot Avenue, Detroit, Michigan
Canadian Distributors
Walkerville Hardware Co., Walkerville, Ont.

For Towing
Baseline Autowline
For Theft Prevention
Powersteel Autowlock
For Sale by all Dealers

Manufactured by
Broderick & Bascom Rope Co. St. Louis New York

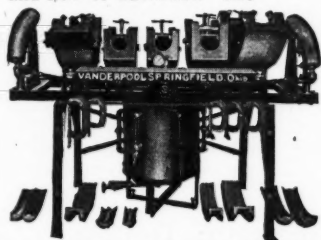
Winton Six

Winton Six beauty is no accident. Our artists have made it their serious study for years. Best of all, we produce for you that particular beautiful effect that you most desire: your Winton Six will be a distinctly personal possession. Catalog gladly sent upon request.

THE WINTON COMPANY
424 Berea Road, Cleveland, Ohio, U. S. A.

DON'T LET THIS BE ANOTHER "LOST OPPORTUNITY"

We urge all wide-awake, up-and-doing, ambitious men with a small savings account to go into the **Tire Repairing Business**. Big money. We instruct you free, teach you everything, how to begin and how to advertise. The



VANDERPOOL VULCANIZER

5 cavity model has capacity of \$100.00 worth of work a day and repairs tires upon the correct principle, just as they were made at the factory. Indorsed by leading tire manufacturers. Write for full particulars, testimonials and free Tire Repairing Manual.

In answering address
Dept. L4

The WM. VANDERPOOL CO., Springfield, O.

Stop Worrying About Fire and Explosions! Equip Your Car with



The time-proved receptacle endorsed by big automotive engineers.

The finest seamless drawn steel, tinned and tested — absolutely leakless — they carry your "gas" as it should be carried

JANNEY, STEINMETZ & COMPANY
Main Office, Philadelphia
New York Office, Hudson Terminal Building

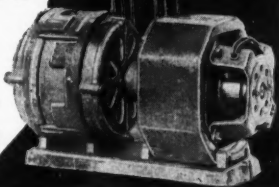
OUR 3-G MOTOR GENERATOR WILL MAKE YOU BIG PROFITS

ANYONE can operate it. Reasonable in cost. Will make you more money with less time and labor, than any other department in your shop.

Our 3-G size charges from one to eight 6-volt batteries. Our 9-G size, one to twenty-four batteries.

Write for particulars. Already there are over 10,000 of our vibrating type Battery Chargers making big money for garage and repair men.

ST. LOUIS ELECTRICAL WORKS,
4057 Forest Park Boulevard
Saint Louis, - Missouri



QUICKER Than Sight

In fog, at night or in the jam of congested traffic the one never failing warning signal is the Buell Explosion Whistle. Its sharp insistent note stabs at the heart of the danger zone. It has saved thousands of lives and thousands of dollars in damage suits.

BUELL EXPLOSION WHISTLE

Responds promptly to the slightest touch, 40 of the largest passenger car and truck manufacturers recognize its value and include it in their equipment. Safe, dependable and GUARANTEED for 10 years.

At all dealers or sent direct
\$4.25 Single Tone; \$6.00 Chime

BUELL MANUFACTURING COMPANY

2977-79 Cottage Grove Avenue Chicago

PHILADELPHIA DIAMOND GRID BATTERY

Diamond Built for Strength

Guaranteed 18 Months

Write for our new dealer proposition

PHILADELPHIA STORAGE BATTERY CO.
Ontario and C Streets Philadelphia, Pa.

Steel Tires & Mud Chains



Old Tires
Covered
Complete



Try 2 or 3 sections over any old blowout. Can't have blowouts, punctures; neither can the rubber wear off.

Special Prices to Those in New Territory

Kimball Tire Case Co., 173 Broadway



Anti Skid

Mud chains can be put on in a jiffy with one hand while standing on the running board. Hook the ends together and push the little lever. If you get in a mud hole you will laugh out loud.

Council Bluffs, Ia.

Selden Trucks

Light Delivery 1, 2, 3½ and 5 Ton

Write for full information on the Selden Line



DEALERS: Write or wire for desirable territory

Selden Truck Sales Company
Rochester, N. Y., U. S. A.



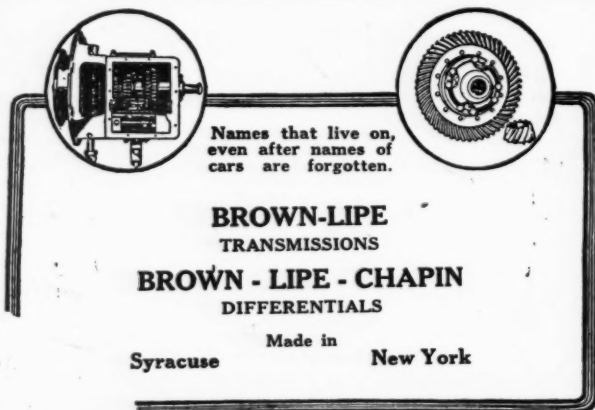
The Ever Watchful Guardian of Your Battery.

A Real Necessity to Avoid Battery Trouble.

Owners and Dealers, Write for Details.

Manufactured by
Jewell Electrical Instrument Co.
1646 W. Walnut St., Chicago

Sales Department
Gray-Heath Company
1440 Michigan Ave., Chicago



Names that live on,
even after names of
cars are forgotten.

BROWN-LIPE
TRANSMISSIONS
BROWN - LIPE - CHAPIN
DIFFERENTIALS

Made in
Syracuse New York



THE Mercer shield is the badge of fastidious taste in automobile. Mercer means the utmost in substantial smartness, riding comfort, and power. The possessor of a Mercer invariably feels a bit better satisfied than the owner of another car. Correspondence from dealers invited.

Mercer Automobile Company :: Trenton, N. J.
800 Whitehead Road

"DEFIES TIME AND THE ELEMENTS"

CHASE
DREDNAUT
Motor
Topping

Write for Samples and Particulars

L. C. CHASE & CO., BOSTON

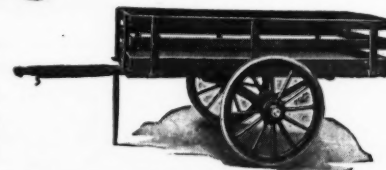
New York San Francisco Detroit Chicago

Jackson Auto Trailers



Built by men who are pioneers in the industry, of the best materials obtainable, and sold at a price that is right.

Built in six different models, a size for every load and car, Write us for our dealer's proposition and complete information.



THE MILES MFG. CO. DEPT. 10 Jackson, Mich.

ECLIPSE
BENDIX DRIVE

*Starts 155 Different
Makes of Motor Cars
and Motor Trucks*

Manufactured By
ECLIPSE MACHINE CO.
ELMIRA, N. Y.

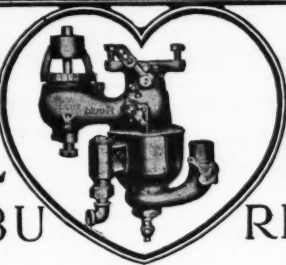
SPRINGS YOU ARE SURE OF

No uncertainty
as to service or wear of
HIGGINS QUALITY SPRINGS
FOR REPLACEMENT

No center breakage—new nlb construction prevents it. Absolute security from tip to tip—combined with utmost riding comfort. Squeak and rust-proof. Painted black. Ready for installation. For all cars. Quick service. Big discounts to dealers. Write for catalog C-1917 and prices.

HIGGINS SPRING & AXLE CO.
Dept. 1221, Racine, Wis.

NO BOLT-NO HOLE-NO HUMP



SCHIEBLER
CARBURETOR

"The Heart of the Automobile"

THE WHEELER-SCHIEBLER CARBURETOR CO. Inc.
INDIANAPOLIS • INDIANA

THE DEFENDER

Is the "Standard" Ford Ignition Lock. Always demand the Defender, and take no imitations. The Defender safely locks the coil box, and is the lock that grounds the electrical system; this makes the car thief-proof. Many Insurance Companies require the Defender and allow 15% off on Insurance, when the Defender lock is used.



Sells for \$4.00
Worth the price of car

Defender Auto-Lock Co.
5th Floor Marquette Bldg.
DETROIT MICH.


MARMON 34

Advanced Engineering

1100 pounds lighter.
136-inch wheelbase.
40 to 50 per cent more mileage from tires.
50 to 75 per cent more miles from fuel.

NORDYKE & MARMON COMPANY
Established 1851
INDIANAPOLIS, IND.

(586)



BLOOD BROS.
UNIVERSAL JOINTS
Positively Lubricated
Can-Less Joints in Six
Sizes for Pleasure Cars,
Trucks and Tractors
Write For Booklet
BLOOD BROS. MACHINE CO.
Allegan-Mich.

STORM

MOTOR REPAIR
EQUIPMENT



Is indispensable for speed, accuracy and efficiency. They will make money for you.

Write for COMPLETE Catalog covering
Cylinder Boring Machines,
Connecting Rod Bearing Reamer, Jig and
Straightening Gauge,
Piston Vise, Valve Renewing Tools,
Light Weight Pistons, etc.

For Sale by Leading Jobbers Everywhere
STORM MFG. CO.
Box 226 THOMPSON, IOWA

TIMES change — but New Departure Quality, never. Better consult our Engineers in designing your new bearing equipment.

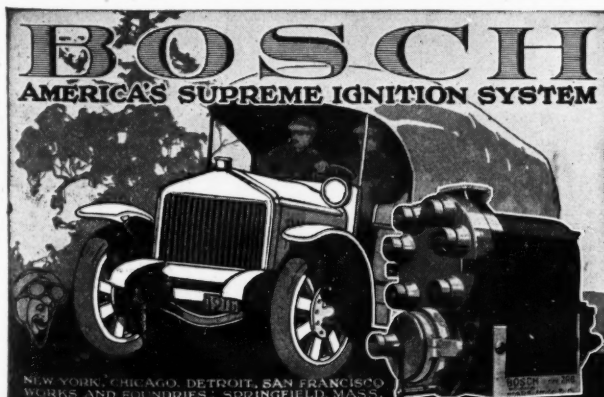
THE NEW DEPARTURE MANUFACTURING CO., Bristol, Conn.

New Departure Ball Bearings



BOSCH

AMERICA'S SUPREME IGNITION SYSTEM



NEW YORK, CHICAGO, DETROIT, SAN FRANCISCO
WORKS AND FOUNDRIES, SPRINGFIELD, MASS.

KINGSTON CARBURETOR

Save Money by Economizing Gasoline

Four floating bronze ball valves opening automatically under different motor suction supply a uniform mixture at any speed regardless of hot, cold, wet or dry weather.

Write for details and let us tell you why so many manufacturers are adopting this carburetor as standard equipment

MADE BY THE OLDEST MANUFACTURERS OF CARBURETORS
IN AMERICA
ESTABLISHED 1895

BYRNE, KINGSTON & COMPANY, Kokomo, Ind.

Guaranteed for 10,000 Miles Bricton Pneumatic Tires

Every Bricton Tire is sold under a specific 10,000 mile written service guarantee. This guarantee is the longest and strongest ever put behind a pneumatic tire and is a positive protection to every purchaser. Bricton Tires are Puncture-Proof, and proof against blowouts, skidding, ruts, rim-outs, oil and gasoline. Wonderful resiliency, easy riding qualities and economy commend them to every car owner.

Retread Your Present Tires—If your present tires are new, or if your tires have been used and the rubber tread has been worn off or thin, protect them with Bricton Treads and get greater service out of your tires and also make them puncture proof, oil proof, rut proof, gasoline proof and non-skid.

FREE TRIAL OFFER—To convince you Bricton Tires will give you satisfaction you may try them on your car at our expense. Write today for this Free Trial Offer, a copy of our guarantee and full information about Bricton Tires and Treads.

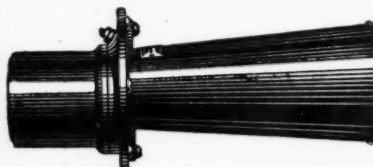
THE BRICTON MFG. CO.
1015 to 24 Woodmen of World Building
Dept. 12-118 OMAHA, NEBRASKA



SPARTON PRODUCTS

First Choice of America's Best Cars

Sparton Motor-Horns—Hand-Operated and Motor-Driven. Sparton Gasoline Vacuum Systems, Sparton Honeycomb Radiators and Sparton Radiator Fans
The SPARKS-WITHINGTON CO., Jackson, Mich., U. S. A.



Pacific Coast
Representative

**NORMAN
COWAN CO.**
San Francisco
Calif.



SHALER MAKE MONEY Electric Repairing Tires Shop Vulcanizer



The high cost and limited supply of tires makes it necessary for motorists to conserve their tires and get maximum mileage. Present conditions offer tire repair men a big opportunity to make money. Experienced help not necessary.

With this Shaler Electric Vulcanizer you can make money easy. It heats from city electric light current—has automatic heat control—no danger of fire or explosions.

Will mend any style or size of tire—both casing and inner tube. Handles 12 casings and 200 tubes a day. Anybody can operate it, and turn out perfect work. Price \$65.00 complete—Subject to Trade Discount.

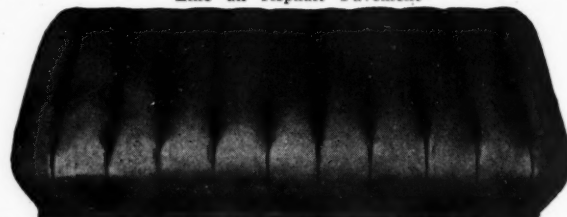
Write at once for catalog of our complete line of Shaler Vulcanizers, Steam or Electric for Repair Shops and quick selling models for motorists.

C.A. SHALER CO., 200 Fourth St., Waupun, Wis.

Make Your Ford Ride Like a Packard or Pierce Arrow
with a

Cathedral Pipe Deluxe Cushion

The Only Cushion in America That Makes All Kinds of Roads Seem
Like an Asphalt Pavement



No Shock Absorbers Necessary. Sold Under a Positive Guarantee to Make Your Car Ride 100 Per Cent Better or Your Money Back.
Let Us Tell You More About It.

American Cushion Spring Co., Dept. A, Kalamazoo, Mich.



GUARANTEE VISIBLE PUMPS

Fast service, full measure and perfectly filtered gasoline, assure dealers the constant patronage of satisfied customers.

Write for the Pump Book

Guarantee Liquid Measure Company
Farmers Bank Bldg. PITTSBURGH, PA.

Are You Wise?

Do you know the detailed specifications of all passenger cars and motor trucks? Do you know the sizes and prices of all tires and tubes sold on the American market? Do you know the size and style of all electric bulb equipment for all passenger cars?

Every first of the month issue of Motor World presents the correct detailed specifications as above indicated. They are invaluable to men in the trade. Motor World is designed and edited for dealers, jobbers and garage owners exclusively. Published weekly. Fifty-two special and regular issues for two dollars per year. A big value—and getting bigger. Send your subscription to

MOTOR WORLD

239 West 39th Street, New York City

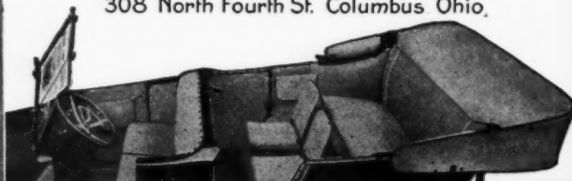
"EASY ON"
SEAT COVERS
TIRE COVERS
TOP COVERINGS

GORDON
EASY-ON SEAT COVERS

WE HAVE
PATTERNS FOR
MORE THAN A
THOUSAND MODELS
OF CARS.

Sold by leading Jobbers and Dealers everywhere
Write for Sample Book and Price List

The J. P. GORDON CO.
308 North Fourth St. Columbus Ohio.



BURD High Compression DISTON RINGS "The Accepted Standard"

BURD HIGH COMPRESSION RING CO.
" ROCKFORD, ILLINOIS "
Sales Offices in All Principal Cities.



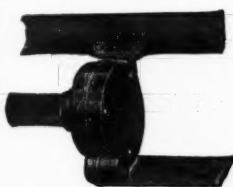
Gasoline Must Be Saved

Conservation is every bit as necessary during the reconstruction period as it was before the armistice was signed. Large quantities of gasoline are still needed for government work. Every Ford owner can cover the same ground, in better time, and slice a third off his gasoline bill by using

THE REMINGTON GASOLINE SYSTEM for Your Ford

Its use enables Ford owners to do away, once and for all, with the High Cost of Low Mileage. It means a bigger up-keep saving than you have ever known—a better travelling record than you have ever had. Prevents formation of carbon in cylinders and insures clean spark plugs. Send for circular.

THE REMINGTON MANUFACTURING COMPANY
1142 Real Estate Trust Building, Philadelphia
Chicago Office: 67 East Lake Street



Don't Waste Your Gasoline for Uncle Sam Needs It

Equip your car with a VACUUM MUFFLER

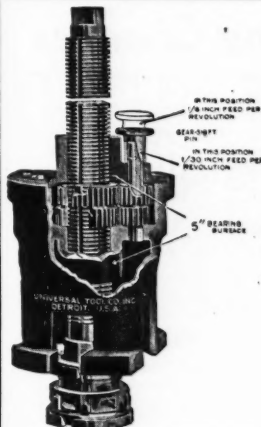
It offers practically no back-pressure which, of course, means more Power at a less consumption of gas.

Model "S" made especially for Ford

VACUUM MUFFLER CORP.

154 NASSAU STREET

NEW YORK



A Better Way

Garagemen who know and Manufacturers of the finest Motors do not "lap in" cylinders nowadays.

No indeed—they have a better way—they bore them to definite oversize dimensions or true them up for the old pistons.

With the Universal Cylinder Reboring Tool, of course!

You will be interested in learning what the tool is doing for them—about the tool itself—how it can be used on either open or closed end cylinders—why you can make any size cut from one to thirty-one one-thousandths of an inch, absolutely true to one-half of one-thousandth of an inch.

See current issue of Automobile Trade Directory for list of jobbers carrying Complete Stock

The Universal Tool Co., Inc.
Detroit, Michigan



JORGENSEN VAPOR PRIMER

It Vaporizes the Starting Charge

Universally accepted the standard primer for motor trucks, tractors, passenger cars, airplanes and motor boats. The most perfectly constructed and most efficient primer on the market.

Write for free descriptive folder

JORGENSEN MFG. COMPANY
Waupaca, Wisconsin



Accidents will happen even in the best-regulated traffic.

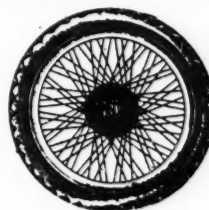
So put a



on your automobile. It absorbs the bumps.

Edward V. Hartford, Inc.
146 Morgan Street
JERSEY CITY, N. J.

WHEN THE "COD" SAYS "STOP"



PASCO WIRE WHEELS

Three exclusive patented features giving—

1. A stronger web with more crossed spokes.
2. A more dependable Hub Cap—impossible to strain or break.
3. A Safety Locking Device, giving greater safety.

Pasco Wire Wheels—mean strength, safety, economy and distinctive beauty.

To dealers they offer an unusual opportunity for profits.

Write for proposition.

NATIONAL WIRE WHEEL WORKS, Inc.
GENEVA, N. Y., U. S. A.



National Big Power Spark Plugs

are unequalled for Heavy Duty and Continuous Service. 10 Hot, Fat Sparks insure positive ignition and complete combustion. Price \$1.00 at dealers. Booklet on request.

BERGIE NATIONAL SPARK PLUG CO.
306 E. State St. Rockford, Ill.



ZENITH CARBURETOR

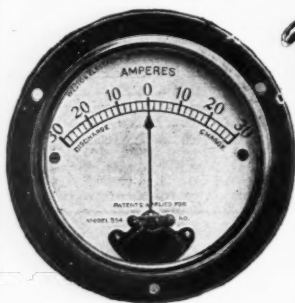
KNOWN the world over as the zenith of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

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New York Detroit, U.S.A. Chicago

You're Taking Long Chances

—If you are trusting to luck that your electrical equipment won't fail at a critical moment. Install a



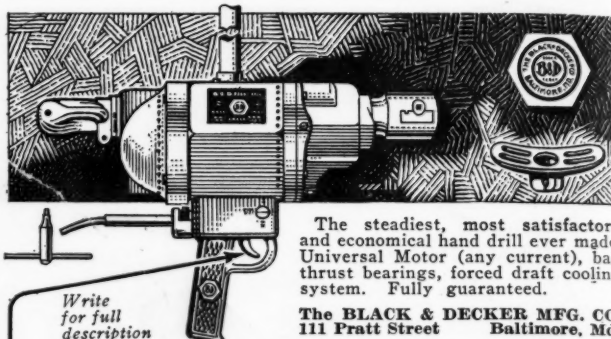
Weston

MODEL 354 AMMETER

On Your Dashboard or Cowl

It is the reliable means of determining the proper rate of charge or discharge of your battery for various speeds. It enables you to determine that the generator is working and that the storage battery is receiving its proper charge. Write us!

Weston Electrical Instrument Co.
10 Weston Ave., Newark, N. J.
23 Branch Offices in the Larger Cities



Write
for full
description

The steadiest, most satisfactory and economical hand drill ever made. Universal Motor (any current), ball thrust bearings, forced draft cooling system. Fully guaranteed.

The BLACK & DECKER MFG. CO.
111 Pratt Street Baltimore, Md.

B & D Portable Electric Drill

WITH THE PISTOL GRIP and THE TRIGGER SWITCH

Goodrich

AUTOMOBILE PRODUCTS

Protect Your Ford—Equip It With a

GOODRICH IGNITION LOCK

The new Goodrich Steering Column Lock fits all cars—Can be installed by the owner himself. Write for literature.
GOODRICH-LENHART MFG. CO., 419 Widener Bldg., Philadelphia

How to know good grease at sight is interestingly told in the advertising columns of next week's issue. Be sure to read it.

TURN TO PAGE 5 AND
READ IT OVER CAREFULLY

Garford

MOTOR TRUCKS FOR EVERY BUSINESS NEED

The Garford Motor Truck Co. Lima, Ohio

Manufacturers of Motor Trucks of 1, 1½, 2, 3½, 5 and 6 ton capacity. 4½, 7 and 10 ton Tractors

CONNECTING RODS REBABBITED

By sending rods to us to be rebabbitted, garage and repairmen make bigger profits and at the same time conserve their mechanics' labor. Only the very best grade of babbitt metal is used.

Prompt, efficient work guaranteed. Ford rods relined, including new wrist pin bushing, 75 cents. Studebaker and others according to size.

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Inner armor for automobile tires prevents punctures and blow-outs. Double mileage of any tire, old or new. Easily applied without tools. Used over and over in several tires. Will not heat or pinch. Cheaper and better than double treads, etc. Details free. Distributors and agents wanted. Sales guaranteed.

AMERICAN ACCESSORIES CO., 250 Gulow St., Cincinnati, Ohio



BEST SELLING ACCESSORY on the MARKET

The Roedding Safety rear-end automotive signal is the most wonderful automatic signal device ever perfected. Car and truck owners buy at first demonstration.

Write for our attractive dealer proposition

K. G. BARKOOT, 1010 Chamber of Commerce Bldg., Detroit

SUNDERMAN Vacuum Carburetor

SUNDERMAN CORPORATION, 11 Chambers St. Newburgh, N. Y.

Save 88% to 94% on Battery Charging



Right in your own home you can charge your storage batteries at an average cost of 6c each with the

F-F BATTERY BOOSTER

Simple, safe, sure acting. Operates from any electric light socket. Frequent use prolongs life of batteries indefinitely. Send for circular No. 14.

THE FRANCE MANUFACTURING CO., Cleveland, Ohio, U. S. A.

The Motor Truck bought today without Electric Starting and Lighting will be out of date to-morrow

BETHLEHEM

Internal Gear Drive
MOTOR TRUCKS
Dependable Delivery

BETHLEHEM MOTORS CORP. ALLENTOWN, PA.

The Motor Truck bought today without Electric Starting and Lighting will be out of date to-morrow

USED ON 90% OF ALL FULLY EQUIPPED CARS

KELLOGG

ENGINE DRIVEN
Tire Pump
KELLOGG MANUFACTURING CO. ROCHESTER, N.Y.

Dyneto

STARTING LIGHTING SYSTEMS

THE DYNETO shows greatest efficiency in both motor and generator. Type D. A. Motor develops a torque of approximately 15 pounds. Type C. A. Generator shows approximately 15 amperes. A car-speed of 15 to 20 M. P. H. keeps batteries fully charged. Starter always sure to start. Lamps always bright. Send drawings and specifications for our recommendation.

Special Outfits for Fords

DYNETO ELECTRIC CORPORATION, Syracuse, N. Y.

Delivery Problems Are Solved by *Standard* WORM DRIVE TRUCKS



2,
3½
and
5
TON

Prompt deliveries of all capacities. Quality, price and demand insure good business. Write for our proposition
GOOD TERRITORY OPEN
STANDARD MOTOR TRUCK CO., Detroit, Michigan



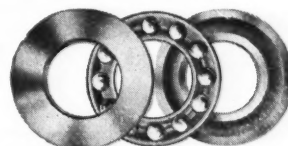
DON'T WAIT till
Your Motor Burns Out

Buy a

BRUNNER SAFETY FUSE PLUG

IT WILL PROTECT YOUR AIR COMPRESSOR
MOTOR AGAINST LOW VOLTAGE, OVERLOADS
AND ALL UNUSUAL ELECTRICAL CONDITIONS

BRUNNER MFG. COMPANY, UTICA, N. Y.



BALL THRUST BEARINGS
made to meet your requirements

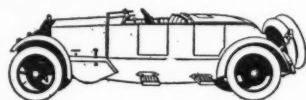
"STAR" BALL RETAINERS

for Thrust, Magneto, and Cup and Cone Bearings

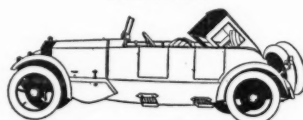
"STERLING" Universal Joints
DROP FORGINGS

Western Sales Office
1012 Ford Building
DETROIT, MICH.

THE BEARINGS COMPANY of AMERICA
LANCASTER, PENNA.



As a roadster



Showing rear deck being raised

SPECIAL bodies of great beauty and distinction with the exclusive Carrm convertible feature—built to order for any chassis. Car dealers will find that Carrm Bodies appeal to the most desirable class of customers.

CARRM AUTO BODY CO.
1926 Broadway New York

CARRM

PATENT BODIES



Transforming body into six passenger touring body



Price
only
\$1.75

THE NEW
UTILITY Universal Rim Wrench
Now Belongs in Every Tool Box
and Every Garage

Automatically fits every nut used in connection with demountable rims on all makes of cars. Now beautifully finished in nickel and black enamel. More compact and lighter. Improved throughout. Selling on sight. Complete, only \$1.75.

Write for complete details
Dealers, ask for liberal discounts

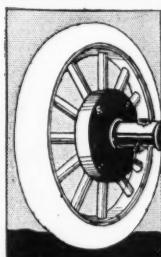
THIS NEW WRENCH SELLS
HILL PUMP VALVE CO.

Manufacturers of Famous
Utility Protected Heaters for all Motor Cars
Archer Ave. and Canal St., Chicago
Sales Department:

THE ZINKE CO., 1223 South Michigan Ave., Chicago

TRADE MARK REGISTERED IN
NON-FLUID OIL
UNITED STATES PATENT OFFICE

No Greasy Brakes
NON-FLUID OIL stays in
Differentials - will not
creep onto brake drums



"K000" For Bearings — "K00 Special" for Gears
in orange cans — at all dealers.
New York & New Jersey Lubricant Co. 165 Broadway New York

The "Big Stick" That Brings Down Gasoline Expense

Up goes the price of gasoline!
Maximum mileage is the
big problem of the
day! Solve it with
the new Stromberg
Carburetor.



The Official
world's records made
by the New Stromberg in gasoline
mileage prove that you need the New
Stromberg on your car. Mail coupon for details of
how the New Stromberg will reduce your gasoline bills.
Stromberg Motor Devices Co., Dept. 1227, 64 E. 25th St., Chicago

New **STROMBERG** Does it!
CARBURETOR

THE CLEARING HOUSE

OF THE MOTOR INDUSTRY

FOR PARTS, ACCESSORIES, TIRES, MACHINERY, REBUILDING, REPAIRING, WELDING AND USED CARS.
ALSO HELP AND SITUATIONS WANTED AND MISCELLANEOUS CLASSIFIED ADVERTISING

WHY

WE ARE

"THE WORLD'S LARGEST USED PARTS CONCERN"

FROM the first day we entered the automobile used parts business our policy has been to build an organization on a foundation of honest merchandising methods coupled with a quality of goods that can not be questioned.

**Auto Salvage
Bulletin No. 21**

So well have we succeeded in accomplishing the purpose we set ourselves to that today we stand recognized as the world's largest used parts concern.

For every car owner and every garage or service station we can offer a distinct cash saving of 35 to 90% off manufacturers' list prices on parts. Bear in mind that no part is sent out by us until it has passed a rigid examination. Bear in mind also that every part is sold on a strict money back guarantee.

If you are not absolutely satisfied with any part you purchase from us, that's enough. Return the part to us and your money will be refunded without any long drawn out argument.

Our position as the world's largest concern in this business permits us to carry a stock of parts that will take care of any requirement you put up to us. Parts from more than six hundred models and one hundred and ten makes, form our stock on hand. Write for prices on any part you need. See for yourself just what you can save by doing business with a concern of our standing in the automobile industry. It will be to your advantage to get our prices. Write today.

**Learn to
Depend Upon
Our Service**

Watch next week for Bulletin No. 22

AUTO SALVAGE CO., Inc.

Kansas City, Mo.
1701-03 Main St.

HOME OFFICE:
St. Louis, Missouri
2823-25 Locust St.

Cincinnati, Ohio
314 E. Third St.

Parts and Repairs.

Parts and Repairs.

Parts and Repairs.

"We Tear 'Em Up and Sell the Pieces"

This slogan has built one of the world's largest Used Parts Business—Tens of thousands of owners and garagemen have used our parts—This week we have

MOTORS
Send for list
30.00-150.00
UNIT POWER PLANTS
Send for list
75.00-200.00
REAR AXLES
25.00-75.00
FRONT AXLES
5.00-15.00
RADIATORS
10.00-30.00
WHEELS
2.00-7.50
STARTERS
15.00-30.00
GENERATORS
12.50-20.00
WIND SHIELDS
6.00-10.00
LAMPS
3.00-8.00
BEARINGS
Any style or kind
50c-5.00
SPRINGS
2.00-4.00
SPRING LEVER
25c-50c
TUBE VULCANIZING
50c

RIMS
2.00-3.00
FELLOE BANDS
1.00-1.50
CRANK CASES
10.00-50.00
CYLINDERS
5.00-30.00
CRANK SHAFTS
5.00-30.00
CONNECTING RODS
1.50-5.00
PISTONS
1.00-3.00
DIFFERENTIALS
10.00-20.00
AXLE SHAFTS
1.50-7.50
RING GEARS
1.00-20.00
TRANSMISSION GEARS
50c-20.00
SPOT LIGHTS
3.50
SPARK PLUGS
25c-75c
RELINERS
28x3-30x3
75c-1.00
TRANSMISSION CASES
7.50-25.00

INSIDE PATCHES
3-3½-4-4½-5
20c-35c
LACE OUTSIDE PATCH
3-3½-4-4½-5
25c-50c
HOOK ON BOOTS
3-3½-4-4½-5
25c-50c
DIFFERENTIAL GEARS
50c-1.50
JACKS
1.00-8.75
GASOLINE TANKS
2.00-7.50
PRESTO TANKS
5.00-6.00
SEARCHLIGHT TANKS
2.00-3.00
COLD PATCHES
10c Dozen
METAL POLISH
10c-15c-25c
TIRE COVERS
50c
SEAT COVERS
3.50 Set
TOP COVERS
1.50
TRANSMISSION
25.00-50.00
CARBURETOR
3.00-15.00

Highest
Banking References
are behind our
Guarantee of
Satisfaction
or Money
Cheerfully
Refunded

Auto Wrecking Co.,

13th and Oak
Kansas City, Mo.

PARTS FOR ALL CARS

We Save You 50 to 80% of the Original Cost

MAGNETOS—Overhauled and Guaranteed
Bosch DU Set Spark.....\$19.00
Bosch DU4 Variable 24.00
Bosch DU6 26.50
Bosch DR4 19.00
Bosch DR6 23.50
Bosch D4 14.00
Bosch D6 15.00
Eisemann 12.50
Remy 7.00
Dixie 11.00
Coils, Generators and Starters. Silent
Starter and Generator Chains, all lengths
and sizes.

Lighting and Starting Batteries, \$6.00 to \$15.00
Carburetors
Front Axles
Rear Axles
Transmissions
Axle Shafts
Presto-Lite Tanks, size B \$4.75; E.....\$3.50
Searchlight Tanks.....\$2.50
Roller Ball Bearings (All Makes) \$1.00 to
\$3.50. Pistons, Cylinder Blocks, Crank and
Camshafts, Radiators, etc. Many good mot-
ors in stock.

Tell us your needs

In wrecking cars we obtain and always have for sale a complete stock of parts for all makes of cars. Also tires and tubes whereby we can save you from 50 to 80 per cent

OUR SLIGHTLY USED TIRES AND TUBES

MEAN ECONOMY TO MOTORISTS :: A TRIAL WILL CONVINCE YOU

Size	Tires	Tubes	Size	Tires	Tubes	Size	Tires	Tubes
30x3.....	\$4.00	\$1.35	32x4.....	\$7.00	\$1.60	35x4½.....	\$8.50	\$1.80
30x3½.....	5.00	1.45	33x4.....	7.75	1.70	36x4½.....	8.75	1.85
31x3½.....	5.25	1.50	34x4.....	7.75	1.70	37x4½.....	9.25	1.90
32x3½.....	5.50	1.50	35x4.....	8.00	1.75	35x5.....	9.50	2.00
34x3½.....	6.00	1.60	36x4.....	8.00	1.75	36x5.....	9.50	2.00
31x4.....	6.25	1.65	34x4½.....	8.25	1.75	37x5.....	10.00	2.20

Deposit Required with All Orders

PROMPT ATTENTION TO MAIL ORDERS

MOTOR SALVAGE CO., 1425 State St., Chicago, Ill.

PARTS

For Vim, Buick, Mitchell, Overland, Haynes,
Maxwell, Stoddard-Dayton and 100 or more
others.

Prompt Attention to Mail Orders

ATLANTIC SUPPLY HOUSE

597 BROADWAY

LONG BRANCH, N. J.

When Writing to Advertisers, Please Mention Motor Age

WRITE AUTO PARTS CO.

FOR
Repair Parts

We Can Save You

50% to 75% OFF
Manufacturers' LIST

LARGE STOCK

of Crank Cases, Crank Shafts, Cylinders,
Pistons and Connecting Rods, Transmission
Cases, Rear Axles, Transmission Gears,
Hubs, Spindles, Radiators, Pumps, Bear-
ings, Springs and other parts.

SPECIAL

RADIATORS—Reo, \$15; E. M. F., \$15; and
many others. Write for prices.
GENERATORS—35 Md. G. D. Auto Lite
Generators as used on 83-85 Overland,
\$23.00.

15 Md. G. G. Auto Lite Generators as
used on Chevrolet and 75 Overland, \$20.00.
GEARS—Send us your order for gears. We
have them for all models at low prices.

SERVICE

Every inquiry will receive prompt attention.
Orders shipped same day received. Satisfac-
tion guaranteed or money refunded.

Get our New and Used Parts list. It will
save you money. Write for it today.

Auto Parts Company

4101 Olive Street, ST. LOUIS, MO.

Parts and Repairs.

Parts and Repairs.

Parts and Repairs.

A Real Combination!

UNEXCELLED MERCHANDISE AND SERVICE

If we cannot satisfy you, money cheerfully refunded

Good, Serviceable Parts for All Cars

SPECIAL MOTOR BARGAINS

All in Excellent Condition

National 4 cyl. 1912-13.....	\$125.00
Marmon 4 cyl.....	100.00
Stoddard-Dayton Knight 6 cyl.....	250.00
E. M. P.....	65.00
Premier 6 cyl.....	100.00
Thomas 6 cyl.....	125.00
Rutenber 4 cyl.....	85.00
Packard 30, 1911.....	100.00
Garford 11.....	100.00
Reading 40, 4 cyl.....	100.00
Everett 6 cyl.....	90.00
Pierce-Arrow 6 cyl. Mod. 36.....	100.00
1914 Buda.....	100.00
Studebaker 4 cyl.....	65.00
Studebaker 6 cyl.....	100.00
Renault 4 cyl.....	100.00
Regal Block.....	85.00
Mitchell 4 cyl.....	100.00
Mitchell 6 cyl., T-head type.....	125.00
Cadillac 1910-11.....	85.00
Cadillac 1912-13.....	100.00
Maxwell 25.....	100.00
Tetter 6 cyl. with starter.....	150.00

UNIT POWER PLANTS

King 8 cyl. 1916.....	\$200.00
Continental Model E.....	125.00
Cole 6 cyl.....	150.00
Cole 4 cyl. Model 30.....	90.00
Cole 4 cyl. Model 40.....	100.00
Chalmers Master 6 cyl.....	150.00
Chalmers 30.....	85.00
Stevens-Duryea 6 cyl. Mod. Y.....	150.00
Hudson 54.....	150.00
Hudson 37 4 cyl.....	125.00
1915 Lozier.....	125.00
Milwaukee 4 cyl.....	125.00

MAGNETOS

Overhauled and Guaranteed	
DU4 Bosch Set Spark.....	\$20.00
DU4 Bosch Variable Spark.....	25.00
DU6 Bosch.....	27.50
DR4 Bosch.....	20.00
DR4 Bosch 2 spark.....	55.00
DR6 Bosch.....	25.00

50 new Adjustable T Bumpers, nickel or black, fit all cars except Fords.....\$4.50 each
14,000 ft. new radiator hose, price per ft., 1-in., 15c; 1 1/4 in., 20c; 1 1/2 in., 25c

EXTRA GOOD USED

TIRES AND TUBES

Carefully selected from the countless numbers we obtain from wrecked cars. Best Standard Makes in Excellent Condition.

DON'T JUDGE THESE TIRES BY THEIR PRICES

If you don't think they are worth more than we ask—send 'em back

Size	Tires	Tubes	Size	Tires	Tubes	Size	Tires	Tubes
30x3.....	\$5.00	\$1.25	32x4.....	\$9.00	\$1.75	35x4 1/2.....	\$12.00	\$2.25
30x3 1/2.....	6.00	1.50	33x4.....	9.00	1.75	36x4 1/2.....	12.00	2.25
31x3 1/2.....	6.00	1.50	34x4.....	10.00	2.00	37x4 1/2.....	12.00	2.25
32x3 1/2.....	7.00	1.50	35x4.....	10.00	2.00	38x5.....	15.00	2.50
34x3 1/2.....	8.00	1.50	36x4.....	10.00	2.00	39x5.....	15.00	2.50
31x4.....	9.00	1.75	34x4 1/2.....	12.00	2.25	37x5.....	15.00	2.50

New Firsts

Tires	Tubes
30x3.....	\$2.00
30x3 1/2.....	\$13.00
31x4.....	18.00
32x4.....	18.00

One dollar deposit required with each tire ordered. Balance C. O. D. subject to examination. Mail orders shipped same day. Highest prices paid for wrecked cars.

New Non-Skid

Standard Makes	Factory Seconds
33x4 SS.....	\$19.00
34x4 SS.....	19.00
35x4 1/2 SS.....	25.00

WARSHAWSKY & CO.

Largest Car Wreckers in the West

PHONE CALUMET 7315

1915 South State Street

Chicago, Illinois

When Writing to Advertisers, Please Mention Motor Age

RADIATOR & Hood Covers

Protect your cooling system. Cover your Radiator and Hood—we make covers for any car to order. We have a lot of miscellaneous covers which are priced right. Get one of these for your car or let us make you one to order.

6 VOLT EXIDE BATTERIES

We have some 6 volt 100-hour Exide Storage batteries—brand new—never used—which we bought right. There are but a few of them and they will go fast at \$20.00.

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A satisfied customer is our biggest asset, therefore we must satisfy you.

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30x3½.....	5.00	1.45	33x4.....	7.75	1.70	36x4½.....	8.75	1.85
31x3½.....	5.25	1.50	34x4.....	7.75	1.70	37x4½.....	9.25	1.90
32x3½.....	5.50	1.50	35x4.....	8.00	1.75	35x5.....	9.50	2.00
34x3½.....	6.00	1.60	36x4.....	8.00	1.75	36x5.....	9.50	2.00
31x4.....	6.25	1.65	34x4½.....	8.25	1.75	37x5.....	10.00	2.20

Send \$1.00 deposit with each tire ordered. Tires will be sent promptly C. O. D.,
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A TRIAL WILL CONVINCE YOU

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30x3½.....	5.00	1.45	36x4.....	8.00	1.75
31x3½.....	5.25	1.50	34x4½.....	8.25	1.75
32x3½.....	5.50	1.50	35x4½.....	8.50	1.80
34x3½.....	6.00	1.60	36x4½.....	8.75	1.85
31x4.....	6.25	1.65	37x4½.....	9.25	1.90
32x4.....	7.00	1.60	35x5.....	9.50	2.00
33x4.....	7.75	1.70	36x5.....	9.50	2.00
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30x3½.....	5.00 2.35	32x4.....	8.00 3.25	35x4.....	8.50 3.75	35x5.....	10.00 4.65
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30x3½.....	5.00	33x4.....	7.75	36x4½.....	8.75
31x3½.....	5.25	34x4.....	8.00	37x4½.....	9.25
32x3½.....	6.00	35x4.....	8.00	38x4½.....	9.50
34x3½.....	7.00	36x4.....	8.50	39x4½.....	9.50
31x4.....	7.00	34x4½.....	8.50	37x5.....	10.00

Send \$1.00 deposit with each tire ordered. Balance C. O. D., subject to examination. Specify if Clincher, Q. D., or Straight Side.

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32x3½.....	3.40	35x4½.....	4.80
32x4.....	3.65	36x4½.....	5.05

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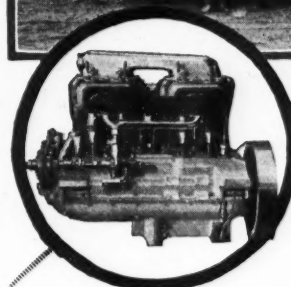
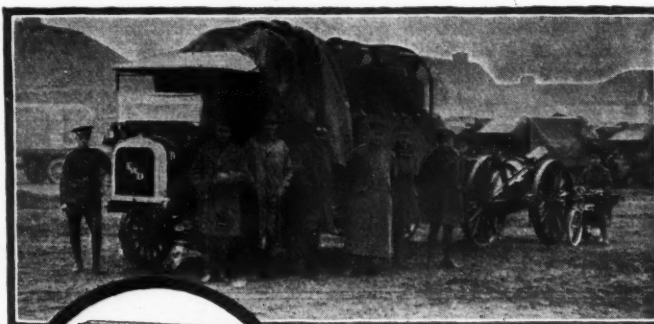
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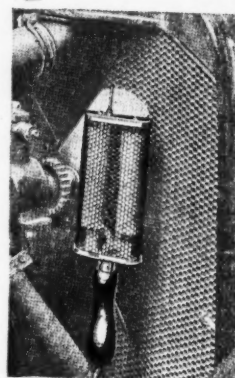
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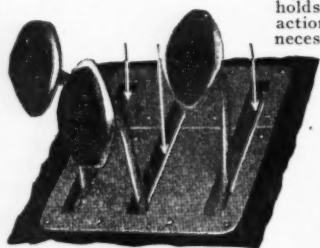
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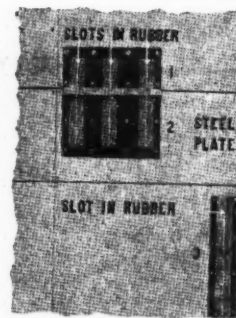
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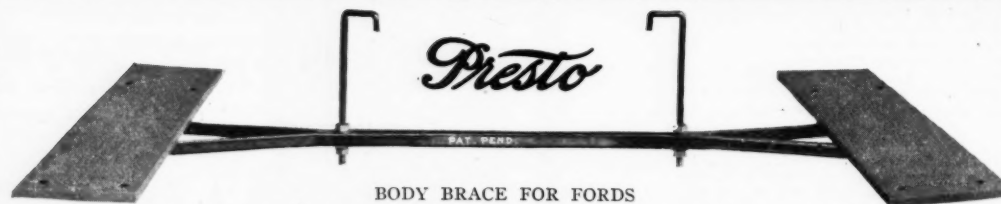
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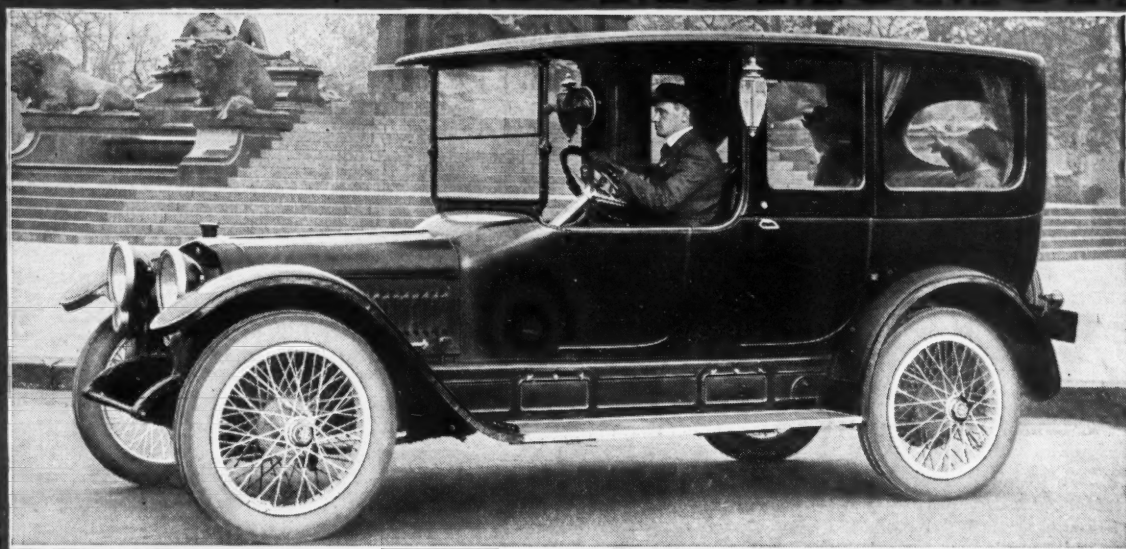
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